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TREND OF MORTALITY AND MORBIDITY DURING 1937 AND RECENT PRECEDING YEARS

Based on Provisional Data For All Years

MORTALITY

The mortality rates in this report are based on preliminary data for 40 States, the District of Columbia, and Hawaii for the calendar year 1937. This area includes about 85 percent of the total population of the country. Data are presented for each State except New Hampshire, Florida, Mississippi, Arkansas, Texas, New Mexico, Arizona, and California.

This report is made possible through a cooperative arrangement with the respective States which voluntarily furnish provisional tabulations of current birth and death records to the United States Public Health Service which acts as a clearing house and provides for publication of the data received. Because of (*a*) lack of uniformity in the method of classifying deaths according to cause, (*b*) insufficient time to obtain additional information from the doctor to help in the classification of all doubtful cases, and (*c*) the impossibility of including a certain number of certificates that were not filed when the records were tabulated, these data are preliminary and may differ in some instances from the final figures subsequently published by the Bureau of the Census. The number of States included is considerably larger than the number used heretofore; several States began reporting for the first time during 1936 and 1937.

Preliminary data for previous years from the same source, collected and tabulated in the same way as have been the current data, are included for comparative purposes. These figures are used in preference to the final figures published by the Bureau of the Census because it is believed that they are more nearly comparable with the current provisional information and therefore will show the trend more accurately. Comparative data for all of the preceding years for a few States were not available, and so it was necessary to substitute figures obtained from published State reports in certain instances.

In the past these preliminary reports have provided an early and accurate index of the trend in mortality for the country as a whole.

Some deviation from the final figures for individual States is to be expected because of the provisional nature of the information. It is believed, however, that the trend of mortality within each State is correctly represented. Comparisons of specific causes of death among different States are subject to error because of differences in tabulation procedure and completeness of reporting. Comparisons of this nature should be made only from the final figures published by the Bureau of the Census.

In spite of a minor influenza epidemic during the first quarter of 1937, which resulted in a total mortality rate for that period 7.5 percent above the corresponding rate in 1934 and 1935 and about 2 percent above that for 1936, the mortality rate from all causes for the year, 10.9 per 1,000 estimated population, was 3.5 percent less than in 1936 and approximately equal to the average rate for the period 1933–36 (table 1). Thirty-two of the 41 States (including the District of Columbia) reported a lower death rate than in 1936. During the last three quarters of the year, the total death rate was the lowest reported during the 4 years for which comparative data are shown in table 2.

DISEASES WITH NEW LOW DEATH RATES

For the following diseases, or groups of diseases, the death rates reported in 1937 were the lowest recorded during the past 5 years: Typhoid and paratyphoid fever, scarlet fever, diphtheria, tuberculosis, malaria, pellagra, diseases of the digestive system, nephritis, and diseases associated with pregnancy and childbirth.

The decline in maternal mortality continued throughout 1937, making the seventh consecutive year in which the mortality from the diseases incidental to pregnancy and childbirth has continuously declined. The 1937 rate was 13 percent less than that for 1936 and 22 percent less than the 1933 rate.

It is gratifying to note that the decline in mortality from tuberculosis, which was checked in 1936, has again been resumed. The mortality rate declined 9.6 percent from that recorded in 1936 and reached a new low figure of 49.6 per 100,000 population.

Two of the important communicable diseases of childhood, scarlet fever and diphtheria, were at the lowest level in recent years. The death rate from diphtheria was only about one-half that in 1933, while the rate from scarlet fever was about one-third the corresponding figure for that year.

DISEASES WITH LITTLE OR NO CHANGE

The death rate from meningitis, diabetes, cerebral hemorrhage, heart disease, pneumonia, and accidents was about the same as in previous years. Mortality from pneumonia decreased about 8 per-

cent as compared with 1936, but it was well above the average of the preceding 4 years.

Mortality from heart disease, although slightly less than in 1936, was still about 10 percent higher than during the 3-year period 1933–35. This disease has been increasing in frequency as a cause of death for many years.

The relative importance of accidents as a cause of death has been steadily increasing. In 1937 this cause ranked sixth in importance among all causes and was only slightly less frequent than nephritis as a cause of death. The total death rate from all accidents was 77.4 per 100,000 population, representing a decline of nearly 9 percent from the rate for 1936. The death rate from automobile accidents remained unchanged at 27.7 per 100,000 population.

DISEASES WITH INCREASED DEATH RATES

Mortality from encephalitis, measles, whooping cough, influenza, poliomyelitis, and cancer was higher than in 1936. The incidence of measles and whooping cough fluctuates from year to year, and so the slight increase in 1937 was not unusual. As pointed out in the Public Health Reports for December 17, 1937, Hawaii experienced during 1937 one of the most severe epidemics of measles in recent history. The death rate was 41.7 per 100,000 population as compared with a rate of 0.8 for this group of States and a rate of 2.9 for Kentucky, which reported the highest rate in the United States.

Both influenza and poliomyelitis were epidemic during 1937. For each of these diseases the death rate was the highest recorded during the past 5 years. Both epidemics were fairly widespread, 31 States reporting an increased death rate from influenza and 28 States reporting an increased death rate from poliomyelitis. The highest rates for poliomyelitis were reported from the States west of the Mississippi River; Colorado, Nebraska, and Wyoming each reported a rate greater than 3 per 100,000 population, while Oklahoma reported a rate of 2.3 per 100,000 population.

The death rate from cancer has been steadily increasing, which is due in part to the aging of the population. The rate for 1937, however, was less than 1 percent greater than that for 1936.

BIRTH RATE AND INFANT MORTALITY

The birth rate, which has been declining for many years, increased about 2 percent as compared with 1936 and equaled the rate for 1935. Twenty-seven States reported a higher rate, 12 States reported a lower rate, and 1 State reported the same rate as in 1936.

The infant-mortality rate decreased about 5 percent as compared with 1936 and was the lowest rate reported for these States. This rate, 52 per 1,000 live births, will undoubtedly be slightly less than

the final rate for the entire country since 6 of the States for which no reports were received, and which are, therefore, not included, have relatively high infant-mortality rates.

MORBIDITY

The following data concerning the prevalence of eight communicable diseases are based on reports submitted by the health officers of the several States and the District of Columbia. Although cases of each of these diseases are reportable by law, there is considerable variability in the completeness of the reports. The number of cases reported is somewhat smaller than the number of cases which occur during any given year, but it is believed that the reports are sufficiently complete to reveal unusual prevalence arising from an epidemic.

TABLE A.—*Number of reported cases of certain communicable diseases in the United States in 1936 and 1937 and the median number of cases reported, 1932–36*

Disease	Cases		Median number of cases, 1932–36	Number of States reporting
	1937[1]	1936		
Diphtheria	28,458	30,018	43,156	48
Influenza	402,887	281,757	262,551	35
Measles	311,545	297,398	403,195	46
Meningococcus meningitis	4,989	6,729	3,099	40
Poliomyelitis	8,326	4,286	4,983	45
Scarlet fever	228,877	244,332	220,050	48
Smallpox	11,497	7,834	7,834	48
Typhoid fever and paratyphoid fever	15,841	15,898	22,217	48

[1] Figures for 1937 are preliminary.

DISEASES ABOVE THE MEDIAN PREVALENCE

Two diseases, influenza and poliomyelitis, were sufficiently prevalent to be considered epidemic during 1937. The influenza epidemic started in the West South Central States in December 1936, and by January 1 had spread to all parts of the country. The epidemic was relatively mild and reached its peak during the last week in January. The number of reported cases was about 40 percent greater than in 1936 and 50 percent above the median for the preceding 5 years (fig. 1).

An increased incidence of poliomyelitis was noticed in the South Central States during the latter part of June. By the end of July the epidemic was reported from all parts of the country except the Northeast, where the incidence remained relatively low. The outbreak was most severe in the South Central and East North Central States. The peak of the epidemic was reached shortly after the middle of September. Although the number of reported cases was less than in 1935, it was 67 percent above the average of the preceding 5 years (fig. 2).

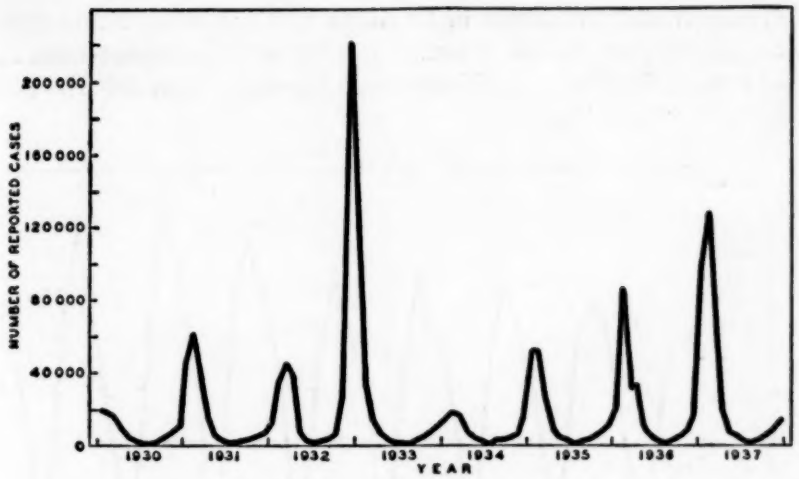

FIGURE 1.—Number of reported cases of influenza, by months, 1930–1937.

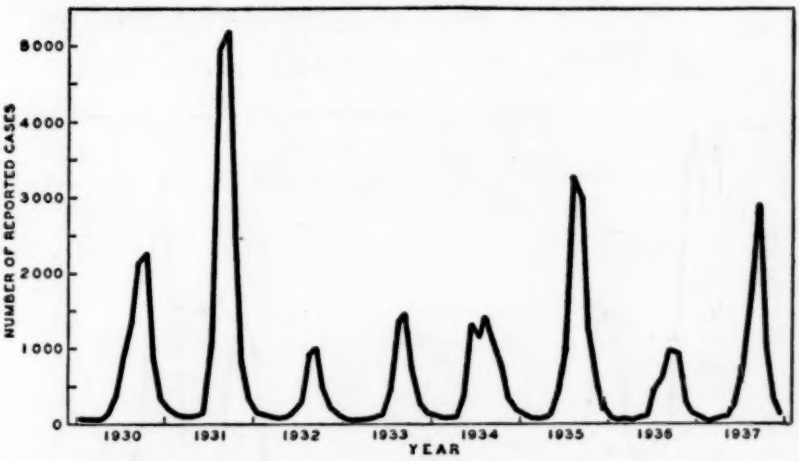

FIGURE 2.—Number of reported cases of poliomyelitis, by months, 1930–1937.

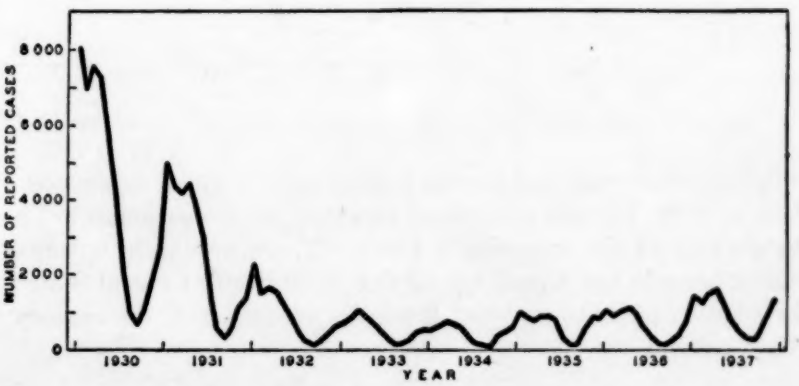

FIGURE 3.—Number of reported cases of smallpox, by months, 1930–1937.

Although the prevalence of smallpox was not of epidemic proportions, the number of cases reported in 1937 was the largest since 1931. About three-fourths of the cases were reported from the Northwest and Pacific Coast States.

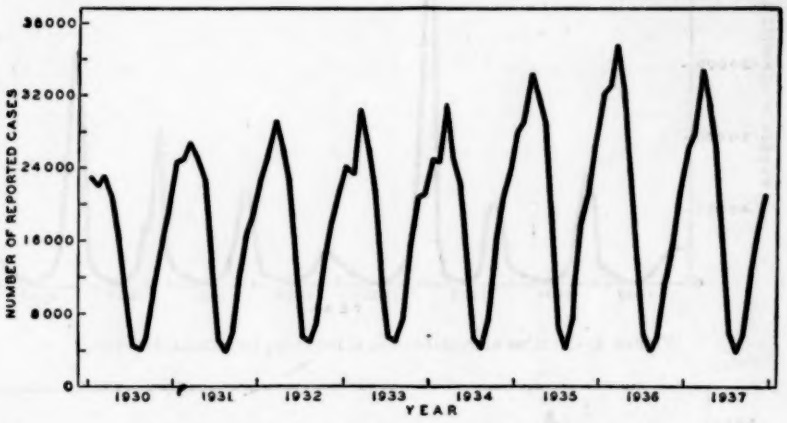

FIGURE 4.—Number of reported cases of scarlet fever, by months, 1930-1937.

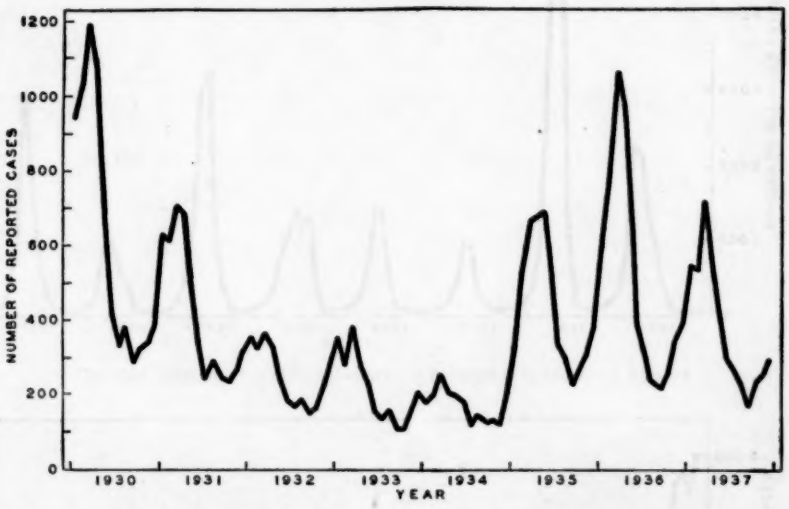

FIGURE 5.—Number of reported cases of meningococcus meningitis, by months, 1930-1937.

Both scarlet fever and meningococcus meningitis were less prevalent than in 1936, but the number of reported cases was somewhat above the average of the preceding 5 years. There were mild outbreaks of scarlet fever in the New England and West South Central States, but the number of cases reported from the remainder of the country was about normal.

DISEASES BELOW THE MEDIAN PREVALENCE

The number of reported cases of diphtheria, measles, and typhoid and paratyphoid fever was 34, 23, and 29 percent, respectively, below the median number of cases reported for the 5-year period 1932–36. The West South Central and Mountain States reported more cases of diphtheria than in 1936, but for the whole country the number of reported cases has been continuously declining for several years.

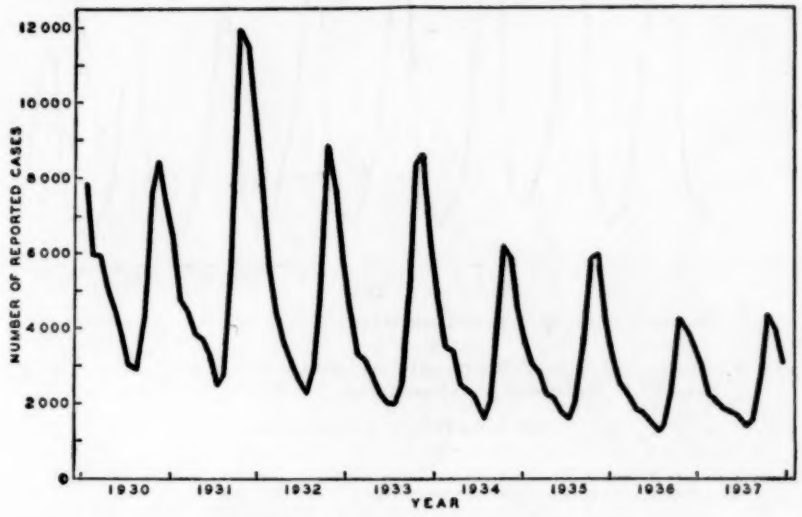

FIGURE 6.—Number of reported cases of diphtheria, by months, 1930–1937.

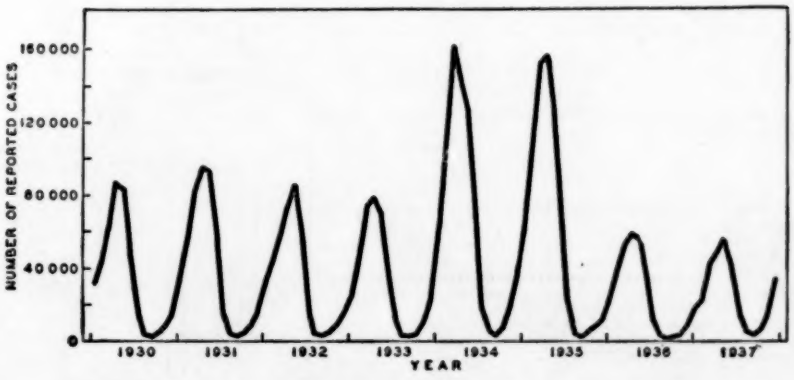

FIGURE 7.—Number of reported cases of measles, by months, 1930–1937.

Although the number of cases of measles was slightly greater than in 1936, it was less than one-half the number reported in either 1934 or 1935, which were years of unusually high incidence. About the first of November, however, a definite increase in the number of cases of measles became evident, and by December it was apparent that another year of exceptionally high measles incidence was beginning. Preliminary data for 1938 indicate that during the winter of 1937–38

the number of measles cases has exceeded any preceding like period in recent years.

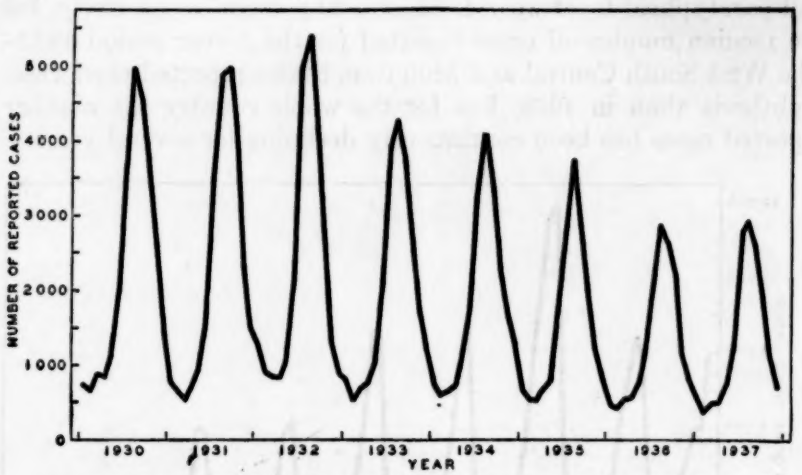

FIGURE 8.—Number of reported cases of typhoid fever, by months, 1930–1937.

TABLE 1.—*Summary of mortality trends from certain causes in a group of 41 States, 1933–37* [1] *(Estimated population July 1, 1937, 109,846,000* [2]*)*

RATES PROVISIONAL FOR ALL YEARS

Diseases (numbers in parentheses are from the International List of Causes of Death, fourth revision, 1929)	1937	1936	1935	1934	1933
	Rate per 1,000 population				
Deaths, all causes	10.9	11.3	10.8	11.0	10.6
Births, exclusive of stillbirths	16.6	16.3	16.6	16.7	16.2
	Rate per 1,000 live births				
Infant mortality (live births, 1937, 1,829,420)	52	55	54	59	57
Maternal mortality	4.6	5.3	5.6	5.7	5.8
	Death rate per 100,000 population				
Typhoid and paratyphoid fever (1, 2)	1.7	2.1	2.3	2.9	3.0
Measles (7)	.8	.7	3.1	4.7	1.6
Scarlet fever (8)	1.5	2.0	2.3	2.1	2.2
Whooping cough (9)	3.5	2.0	3.8	5.4	3.0
Diphtheria (10)	1.8	2.0	2.7	3.0	3.4
Influenza (11)	27.5	23.3	21.0	16.4	25.2
Poliomyelitis and polioencephalitis (16)	.9	.5	.8	.6	.7
Encephalitis, epidemic or lethargic (17)	.7	.6	.7	.7	1.1
Epidemic cerebrospinal meningitis (18)	1.6	2.2	2.2	.9	1.0
Tuberculosis, all forms (23–32)	49.6	51.7	51.6	52.9	55.5
Malaria (38)	1.3	2.1	2.2	2.1	2.0
Cancer, all forms (45–53)	112.1	111.8	109.3	107.6	103.7
Diabetes (59)	24.2	24.4	22.8	22.8	21.6
Pellagra (62)	1.9	2.1	2.0	2.2	2.3
Cerebral hemorrhage, apoplexy (82a, b)	85.4	89.7	85.3	82.2	81.7
Diseases of the heart (90–95)	263.4	265.4	244.2	239.8	222.9
Pneumonia, all forms (107–109)	84.3	92.0	83.0	81.1	71.3
Diseases of the digestive system (115–129) [3]	63.4	68.4	66.6	71.8	65.5
Diarrhea and enteritis under 2 years (119)	8.8	10.3	8.7	11.8	10.5
Nephritis, all forms (130–132)	78.3	82.6	81.1	84.5	81.9
Accidents (176–195, 201–214)	77.4	84.9	77.0	79.4	71.9
Automobile accidents (206, 208, 210)	27.7	27.7	27.2	27.3	24.2

[1] The States included are those listed in table 3, with the exception of California and Florida.
[2] All populations given or used in computing rates are official estimates of the Bureau of the Census as of July 1 of each year.
[3] 39 States only.

TABLE 2.—*Trends of mortality from certain causes in each quarter of 1937, 1936, 1935, and 1934 in the 23 [1] States with available data (estimated population July 1, 1937, 74,151,000)*

RATES PROVISIONAL FOR ALL YEARS

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births		Death rate per 100,000 population (annual basis)																		
			Total infant mortality	Maternal mortality	Typhoid fever (1, 2)	Measles (7)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (11)	Acute poliomyelitis and polioencephalitis (16)	Encephalitis, epidemic or lethargic (17)	Epidemic cerebrospinal meningitis (18)	Tuberculosis, all forms (23-32)	Cancer, all forms (45-53)	Diabetes (59)	Cerebral hemorrhage, apoplexy (82a, b)	Diseases of the heart (90-95)	Pneumonia, all forms (107-109)	Diseases of the digestive system (115-129)	Diarrhea and enteritis under 2 years (119)	Nephritis (130-132)	All accidents (170-194, 201-214) [1]	Automobile accidents [2] (206, 208, 210) [1]
January–December:																							
1937	11.0	16.2	50	4.3	1.4	0.7	1.5	3.1	1.5	25.2	0.9	0.6	1.5	49.2	117.8	26.2	83.1	274.9	81.4	63.4	7.4	78.3	77.0	27.3
1936	11.3	16.0	53	5.0	1.6	.6	2.1	1.9	1.8	20.2	.4	.6	2.3	50.8	116.4	26.1	88.0	276.7	89.1	67.1	8.8	81.8	------	------
1935	10.8	16.1	52	5.2	1.8	3.0	2.3	3.3	2.3	18.8	.7	.6	2.1	50.9	113.8	24.3	84.1	252.7	81.7	65.7	7.2	80.4	------	------
1934	11.0	16.1	57	5.4	2.4	3.8	2.1	4.5	2.4	14.9	.5	.7	.9	52.3	111.6	24.3	79.1	248.5	79.8	70.2	10.3	84.5	------	------
January–March:																							
1937	12.8	15.3	61	5.3	.6	.7	2.9	3.1	1.8	69.3	.2	.7	2.4	53.6	116.9	31.0	92.8	314.6	144.1	60.1	4.2	87.5	68.2	23.0
1936	12.5	15.6	58	5.8	.9	.9	3.6	2.0	2.2	36.4	.2	.6	3.5	53.0	114.7	30.4	98.0	311.5	142.4	62.1	4.8	92.4	------	------
1935	11.9	15.5	63	6.0	.8	5.0	3.2	3.8	2.4	44.1	.2	.6	2.4	54.0	110.4	27.1	90.3	279.5	127.3	63.0	4.2	87.4	------	------
1934	11.9	15.1	64	6.0	.9	5.6	3.3	4.1	2.5	27.6	.3	.6	1.0	54.5	108.6	27.3	86.0	280.1	122.0	63.6	5.7	93.2	------	------
April–June:																							
1937	10.8	15.9	48	4.4	.8	1.2	1.8	2.8	1.1	17.5	.2	.6	1.7	52.2	116.7	24.9	81.4	270.0	73.0	63.3	6.6	80.3	74.1	24.0
1936	11.3	15.5	52	5.3	1.0	1.0	2.7	1.9	1.2	22.8	.1	.6	2.9	53.0	115.6	25.6	87.4	275.6	87.0	63.8	5.6	83.5	------	------
1935	10.9	15.8	53	5.5	1.2	6.2	3.0	4.9	1.4	14.3	.2	.8	2.9	54.4	115.4	23.6	83.8	255.6	84.1	66.9	7.5	82.6	------	------
1934	11.1	15.7	59	6.2	1.7	7.5	2.4	5.3	1.4	12.5	.4	.6	1.0	56.0	112.8	24.5	79.4	250.0	81.4	69.6	8.2	86.5	------	------
July–September:																							
1937	9.7	17.1	44	3.8	2.6	.4	.5	4.0	1.1	3.8	2.2	.6	.8	46.6	118.0	22.8	72.9	234.5	34.0	72.2	12.8	68.0	84.5	29.6
1936	10.3	16.8	46	4.8	2.7	.3	.7	1.8	1.2	4.6	.7	.6	1.1	49.1	115.0	22.4	79.5	239.1	36.9	76.4	13.7	71.1	------	------
1935	9.6	16.9	43	4.7	3.3	.8	1.0	2.6	1.6	4.6	1.6	.6	1.5	47.6	112.6	21.2	74.3	216.4	36.4	69.8	10.8	71.0	------	------
1934	9.9	16.9	52	5.0	4.2	1.4	.8	5.0	1.5	4.6	1.0	.9	.7	48.8	111.3	20.8	70.7	212.9	36.4	80.5	17.1	76.1	------	------
October–December:																							
1937	10.8	16.6	47	3.8	1.4	.5	1.0	2.6	2.2	11.3	.8	.5	.9	44.4	119.7	26.2	85.4	281.2	75.6	60.4	6.0	77.5	81.0	32.6
1936	11.3	16.0	56	4.4	1.9	.3	1.4	2.0	2.7	17.0	.7	.4	1.6	48.2	120.4	26.1	87.1	281.0	90.5	66.2	10.9	80.3	------	------
1935	10.9	16.2	49	4.9	2.0	.3	1.9	1.8	3.6	12.5	.7	.5	1.7	47.6	116.8	25.3	88.2	260.1	80.2	63.0	6.4	80.8	------	------
1934	10.9	16.9	55	4.7	2.6	1.0	2.0	3.5	4.1	15.3	.5	.6	.8	49.8	113.7	24.6	80.4	251.6	80.5	67.1	9.9	82.3	------	------

[1] States included are Connecticut, District of Columbia, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Michigan, Minnesota, Montana, Nebraska, New Jersey, New York, Pennsylvania, Rhode Island, South Dakota, Tennessee, Virginia, West Virginia, and Wisconsin. List includes all of the States with available data for the 4 years covered in this summary.

[2] Data not compiled by quarters prior to 1937.

TABLE 3.—*Trend of death rates for all causes, of birth rates, and of infant and maternal mortality rates, 1933–37*

RATES PROVISIONAL FOR ALL YEARS

State	Deaths, all causes (rate per 1,000 population)					Births, exclusive of stillbirths (rate per 1,000 population)					Infant mortality (rate per 1,000 live births)					Maternal mortality (rate per 1,000 live births)				
	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933
Alabama	10.7	10.9	10.1	10.2	9.5	21.4	21.3	22.0	21.8	20.6	63	66	63	68	66	5.9	6.7	6.2	6.1	6.9
California	(1)	12.5	12.1	11.5	11.6	(1)	13.9	13.3	13.2	12.8	(1)	53	50	52	53	(1)	4.7	4.7	4.4	4.8
Colorado	13.0	12.8	12.4	11.8	11.4	18.8	17.1	17.7	16.9	16.3	70	74	73	73	69	5.5	7.1	7.3	7.5	6.2
Connecticut	10.1	10.1	10.1	10.0	10.1	12.8	12.4	12.4	12.4	12.7	41	42	43	50	49	2.9	4.5	4.3	5.3	6.0
Delaware	13.8	12.8	12.5	13.2	13.2	16.4	15.1	15.8	15.8	15.7	66	64	66	61	60	4.4	7.1	6.4	5.8	6.9
District of Columbia	13.9	14.7	14.3	14.7	14.5	19.5	19.0	18.3	17.9	18.6	61	72	59	64	65	5.3	6.9	6.7	3.6	4.8
Florida	(1)	12.8	12.4	12.8	12.0	(1)	17.1	17.4	16.8	16.5	(1)	59	62	68	63	(1)	8.1	8.7	8.4	11.5
Georgia	10.8	11.9	11.0	11.4	10.1	19.9	19.4	19.9	20.8	19.5	62	70	69	80	68	7.4	7.9	7.2	7.4	7.7
Idaho	9.7	10.8	10.1	10.0	9.2	21.6	21.4	20.4	20.3	18.2	45	50	51	50	47	3.9	3.2	6.2	5.8	4.4
Illinois	11.1	11.8	10.9	11.2	10.6	14.6	14.3	14.3	14.1	13.5	43	47	46	53	51	3.8	4.2	4.7	4.8	5.0
Indiana	11.2	11.7	11.0	11.9	10.8	14.5	14.2	14.0	15.4	13.9	53	53	54	56	55	3.7	4.7	5.2	5.3	5.7
Iowa	9.7	9.9	10.3	10.5	10.1	16.5	16.7	15.8	15.9	15.2	44	42	47	53	50	4.0	4.1	5.4	5.6	4.9
Kansas	10.3	11.5	10.8	10.7	10.6	15.6	16.2	16.8	17.4	16.6	45	51	49	48	53	4.1	5.1	5.3	5.5	4.8
Kentucky	10.2	11.2	10.3	10.7	10.3	21.0	19.3	20.3	21.3	20.0	50	67	59	65	58	3.8	5.6	5.3	5.4	5.3
Louisiana	11.7	12.2	11.2	11.0	10.9	23.9	20.7	19.9	20.3	18.4	64	73	68	70	71	7.5	8.7	7.9	7.9	8.1
Maine	13.2	13.3	13.0	13.1	13.4	18.1	17.9	18.6	18.8	18.2	61	64	63	71	66	5.4	5.1	5.7	6.0	7.0
Maryland	13.2	13.1	12.7	12.6	12.4	16.4	16.0	16.4	16.6	16.7	62	68	62	69	65	4.1	4.3	5.0	5.1	4.9
Massachusetts	9.1	11.8	11.5	11.7	11.8	(1)	13.9	14.4	14.8	14.7	(1)	47	48	49	52	(1)	4.9	5.7	5.4	6.7
Michigan	11.1	11.4	10.8	10.7	10.2	19.0	18.5	18.5	17.7	16.9	48	50	47	52	51	3.6	4.7	4.9	5.3	5.5
Minnesota	10.0	10.7	9.9	10.0	9.6	17.6	16.9	16.4	16.3	15.7	42	46	46	49	50	3.1	4.4	4.9	4.8	4.5
Missouri	11.4	12.3	11.0	12.1	11.1	14.3	14.1	14.6	15.3	15.0	58	58	57	63	55	5.2	6.1	5.7	6.1	5.8
Montana	11.2	11.7	11.8	10.5	9.7	19.0	19.5	19.0	18.7	16.8	49	53	56	52	49	3.4	5.5	4.6	5.7	5.8
Nebraska	9.6	10.0	9.7	9.8	9.4	15.9	17.0	16.6	17.9	17.7	42	44	42	46	51	3.9	5.6	5.7	5.5	4.2
Nevada	12.6	14.4	13.3	13.2	12.8	15.8	14.2	14.4	14.6	14.1	49	70	71	59	73	6.9	5.6	7.7	6.3	8.1
New Jersey	10.1	10.3	10.1	10.3	10.3	12.6	12.3	12.7	12.8	13.3	39	44	47	49	46	3.4	3.8	4.5	5.4	5.1
New York	11.9	11.8	11.5	11.6	11.5	14.3	13.9	14.2	14.3	14.5	45	47	48	52	54	3.9	4.9	5.1	5.2	6.3
North Carolina	9.8	10.4	9.9	10.5	9.2	23.1	22.2	23.3	23.5	22.7	65	67	67	76	66	5.4	6.5	6.6	6.9	6.4
North Dakota	7.9	8.0	8.4	8.4	7.9	18.4	19.3	19.5	20.9	19.0	53	50	59	57	60	4.8	4.3	5.3	4.7	4.9
Ohio	11.8	12.1	11.5	11.5	10.9	15.8	15.4	15.1	14.9	14.3	50	51	50	54	53	4.6	4.9	6.2	6.0	6.1
Oklahoma	8.5	9.2	8.4	8.6	8.2	16.2	16.5	17.4	19.0	17.7	59	60	55	60	56	6.9	6.2	5.9	6.0	6.5
Oregon	12.0	12.2	11.3	10.6	10.6	15.1	13.7	13.1	13.1	12.3	42	44	41	40	40	3.5	5.4	5.4	6.1	5.5
Pennsylvania	11.1	11.0	10.6	10.8	10.6	15.8	15.7	15.8	15.8	15.6	50	50	50	54	53	4.0	4.6	4.9	5.2	5.1
Rhode Island	12.2	12.2	11.5	11.3	11.6	14.9	14.9	14.9	15.2	15.2	50	49	47	54	56	3.4	4.1	4.3	5.7	5.6
South Carolina	10.7	11.2	10.9	11.7	10.7	20.3	21.0	22.1	24.3	22.4	81	80	79	83	78	7.8	7.9	9.5	8.7	8.0
South Dakota	8.9	8.9	9.1	9.5	9.0	16.8	18.6	19.0	19.6	18.4	52	48	50	59	55	4.2	4.1	5.5	4.5	4.1
Tennessee	10.2	11.2	10.4	10.6	10.0	17.6	17.0	18.1	18.0	17.6	60	68	64	75	71	6.2	7.0	6.9	6.3	5.9
Utah	9.4	9.9	9.8	9.4	8.5	24.0	24.3	24.7	24.6	23.2	41	53	49	49	48	3.3	4.4	4.6	4.5	4.5
Vermont	11.4	13.0	12.7	13.0	12.4	14.2	17.0	17.5	17.6	16.5	45	58	49	53	53	8.1	5.0	6.8	3.9	5.7

Virginia	10.7	11.3	10.8	10.9	10.3	18.7	19.0	19.3	19.5	19.6	64	67	64	68	63	5.6	5.1	5.3	5.7	5.6
Washington	11.5	11.7	11.2	10.8	10.4	14.8	13.9	13.7	13.8	13.0	40	46	45	43	39	4.8	5.2	5.2	4.7	6.4
West Virginia	10.3	10.8	10.1	10.0	9.3	22.6	22.3	23.0	23.0	20.3	62	71	61	67	68	4.9	5.3	5.2	5.5	5.1
Wisconsin	10.9	11.3	10.5	10.4	10.0	17.9	17.7	17.6	17.2	16.8	44	47	47	50	49	3.5	4.0	3.7	4.2	4.7
Wyoming	10.6	10.3	9.8	9.1	8.6	19.6	20.4	18.8	19.8	18.3	52	58	51	53	55	3.5	5.0	4.1	6.1	5.7
Hawaii	7.9	7.8	7.8	8.3	9.6	20.0	19.7	21.7	22.4	23.8	69	73	67	75	72	4.7	4.5	4.3	5.4	5.8
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	8.2	8.4	8.4	8.5	8.6	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

[1] Data not available.

TABLE 4.—*Trend of death rates for various causes per 100,000 population*

RATES PROVISIONAL FOR ALL YEARS

State	Typhoid and paratyphoid fever (1, 2)					Measles (7)					Scarlet fever (8)					Whooping cough (9)				
	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933
Alabama	1.9	2.7	2.9	4.6	4.2	0.1	.7	5.2	11.3	0.9	0.4	0.4	0.5	0.5	0.7	6.5	2.6	4.8	11.9	6.2
California	(1)	1.2	1.4	1.5	1.6	(1)	2.4	1.1	1.3	1.8	(1)	1.6	1.1	1.3	1.4	(1)	2.1	1.0	2.8	3.3
Colorado	3.0	3.1	3.5	4.9	5.0	.5	.7	9.9	8.3	.1	2.0	7.1	11.8	4.0	2.5	4.7	4.1	4.1	11.7	4.2
Connecticut	.3	.5	.8	.4	.5	.7	.4	1.9	.4	.5	.6	.6	1.3	.8	1.4	1.4	1.8	1.2	.9	1.6
Delaware	2.2	2.7	2.3	4.0	3.6	1.5	3.1	1.2	7.9	.4	.4	1.9	.4	2.0	.8	6.5	5.0	2.0	9.1	2.4
District of Columbia	1.9	1.6	2.7	1.4	3.3	2.1	1.3	(2)	8.6	.7	.8	.3	1.3	1.4	2.4	2.7	8.4	.5	7.0	1.3
Florida	(1)	2.5	3.8	3.0	4.3	(1)	.4	1.9	7.0	.2	(1)	.1	.1	.3	.6	(1)	1.5	3.7	7.1	2.8
Georgia	4.3	6.2	8.3	10.3	8.2	.3	.2	.9	17.5	2.0	.4	.5	.7	.5	.6	4.6	2.0	4.9	10.8	7.1
Idaho	1.8	2.5	2.5	5.3	4.3	2.8	2.3	2.1	3.4	.6	1.8	10.3	6.1	2.7	.2	3.2	1.6	6.9	3.2	.2
Illinois	.6	.9	1.2	1.7	1.4	.4	.1	3.7	2.7	.7	2.0	3.0	5.2	3.9	3.6	1.9	1.9	2.7	4.0	1.0
Indiana	1.1	1.7	1.5	3.1	2.7	.4	.1	2.6	6.6	.4	2.9	3.3	3.4	3.6	2.5	4.6	1.6	3.9	5.6	2.0
Iowa	.9	1.2	1.3	2.1	1.0	.2	.1	6.0	2.6	.2	3.8	3.1	2.8	2.4	1.8	3.3	1.4	1.7	3.8	2.5
Kansas	.9	1.7	1.6	1.4	1.6	.2	.2	12.0	1.9	.7	3.5	4.1	2.4	1.8	2.1	2.4	.9	2.8	4.8	3.2
Kentucky	5.4	7.4	8.9	10.3	11.5	2.9	2.7	8.2	6.7	4.0	1.7	1.6	2.6	2.7	2.6	8.2	2.6	9.7	10.6	4.9
Louisiana	6.3	7.0	9.2	9.8	11.6	.8	2.4	6.0	7.8	1.7	.6	.2	.4	.6	.5	6.8	4.7	3.2	10.4	5.7
Maine	1.6	.8	2.0	2.4	1.8	.4	2.5	7.0	2.3	(2)	.5	.8	1.2	1.1	1.7	3.0	2.7	3.6	11.8	1.9
Maryland	1.8	1.7	2.7	2.5	2.2	2.3	1.6	1.4	9.0	.2	.9	.7	1.7	1.6	2.4	5.8	5.1	2.6	7.5	4.9
Massachusetts	.2	.2	.3	.3	.6	.6	.8	.8	2.1	.7	.8	1.0	1.4	1.8	2.6	2.1	1.2	1.6	2.8	2.3
Michigan	.6	.8	.7	1.5	1.1	.2	.3	3.9	.7	2.3	3.0	2.4	2.0	3.7	3.4	2.7	2.2	2.8	3.1	3.2
Minnesota	.3	.5	.6	.5	.8	.3	.9	2.4	1.5	2.7	1.5	4.1	3.0	1.2	1.4	2.8	1.2	2.4	4.2	2.8
Missouri	4.2	5.2	3.7	5.7	5.2	.5	.4	3.8	8.5	1.8	2.6	2.2	1.7	2.4	2.9	4.7	1.7	4.4	6.6	2.6
Montana	2.0	1.9	2.4	3.0	2.8	.7	.6	9.2	5.5	2.6	2.0	8.7	4.0	2.1	1.9	2.6	3.0	4.3	4.7	3.0

[1] Data not available.
[2] No deaths reported.

TABLE 4.—*Trend of death rates for various causes per 100,000 population*—Continued

RATES PROVISIONAL FOR ALL YEARS

State	Typhoid and paratyphoid fever (1, 2)					Measles (7)					Scarlet fever (8)					Whooping cough (9)				
	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933
Nebraska	1.0	.9	.4	1.2	.7	.3	.7	6.2	1.6	.6	2.6	4.8	2.9	1.8	1.8	2.0	1.7	1.2	6.1	2.0
Nevada	(3)	2.0	3.0	6.1	4.2	(3)	(3)	3.0	6.1	(3)	2.0	8.0	1.0	(3)	2.1	2.0	4.0	3.0	2.0	1.0
New Jersey	.6	.7	.6	.9	1.0	1.2	.3	1.3	1.2	1.7	.3	.7	.6	1.5	1.4	1.1	1.3	2.3	1.5	1.0
New York	.5	.6	.5	.7	.9	.4	1.0	1.5	.6	2.6	.8	1.4	1.5	1.2	1.7	1.3	1.1	2.5	1.8	2.3
North Carolina	2.3	2.2	2.3	2.6	3.9	1.1	.3	2.0	9.3	2.5	.5	.7	.6	1.2	1.4	4.9	1.1	8.8	12.7	5.9
North Dakota	.4	.6	1.3	2.0	1.3	(3)	.4	7.6	3.7	4.0	1.7	4.7	4.3	1.9	1.6	1.4	.6	6.1	5.9	2.9
Ohio	1.5	1.8	1.5	2.0	1.8	1.5	.6	2.3	2.3	1.8	1.9	2.4	3.6	3.6	3.2	4.3	2.8	2.7	4.4	2.2
Oklahoma	5.3	5.2	7.5	8.4	9.9	.9	.6	1.8	15.3	2.8	1.3	1.7	.9	1.0	.9	3.3	1.6	6.2	7.4	3.3
Oregon	.8	1.7	1.5	1.7	1.8	.1	4.1	1.5	.6	1.0	1.0	1.8	2.1	2.4	2.7	2.1	2.0	1.7	3.1	1.0
Pennsylvania	1.1	1.0	.8	1.1	1.2	.8	.3	2.2	2.6	1.2	1.5	1.6	1.9	2.3	2.7	2.6	1.5	2.0	3.2	1.9
Rhode Island	.1	.4	.3	.7	.4	.4	.7	1.0	.4	(3)	1.6	1.9	.4	.6	1.3	3.1	1.0	1.2	3.2	3.8
South Carolina	6.4	10.0	10.3	11.7	10.1	.9	.4	1.3	9.7	3.4	.3	.6	.4	.5	.8	4.5	3.5	9.5	16.3	6.0
South Dakota	1.0	1.6	1.4	2.0	5.0	(3)	.3	4.0	16.9	1.0	2.9	3.6	2.7	1.4	1.6	3.0	.6	4.0	7.9	6.4
Tennessee	4.8	5.0	6.4	7.4	8.6	1.1	.8	1.3	16.0	2.8	.7	.8	1.0	1.5	1.7	4.7	2.5	13.4	9.2	5.5
Utah	.4	1.6	.8	1.4	.6	.8	1.2	6.2	11.5	.6	1.7	8.5	12.0	1.6	4.3	2.7	4.3	7.8	5.3	2.9
Vermont	1.0	1.6	1.1	2.1	.8	(3)	5.8	1.6	.8	.3	.3	.8	2.1	1.6	2.2	.8	2.6	3.4	4.5	3.2
Virginia	1.9	2.7	2.8	3.1	4.2	2.4	1.1	5.1	5.8	2.0	.2	.5	.9	1.7	2.0	7.8	4.4	7.5	7.8	4.2
Washington	.7	1.1	1.0	1.7	1.5	.8	2.0	1.5	.9	.6	1.0	1.5	1.5	1.6	.9	1.9	.8	1.9	2.6	.2
West Virginia	4.4	4.2	5.3	6.9	8.0	2.1	1.6	6.4	3.4	2.5	1.9	2.2	4.5	4.4	2.5	13.1	3.9	6.9	11.8	6.0
Wisconsin	.4	.4	.3	.6	.5	.2	.4	2.5	2.3	.9	2.3	4.4	3.8	1.8	1.3	2.2	1.4	1.8	3.6	2.0
Wyoming	1.3	.4	2.6	2.2	4.8	.4	(3)	13.4	4.8	.9	3.8	9.4	11.2	3.0	2.2	5.1	1.3	6.9	3.0	4.3
Hawaii	1.6	2.0	2.4	3.1	5.3	41.7	6.2	(3)	.2	.5	(3)	(3)	(3)	(3)	(3)	2.2	.4	2.6	13.3	12.4
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	.9	1.0	1.1	1.5	1.6	1.0	.9	2.5	2.7	1.5	1.6	2.1	2.6	2.6	2.6	3.0	1.7	2.7	3.7	2.3

State	Diphtheria (10)					Encephalitis, epidemic or lethargic (17)					Acute poliomyelitis and polioencephalitis (16)					Epidemic cerebrospinal meningitis (18)				
	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933
Alabama	3.4	4.0	4.5	5.7	5.6	0.4	0.3	0.7	0.5	1.1	0.6	1.3	0.5	0.6	0.4	3.9	0.9	0.8	0.4	0.4
California	(1)	2.1	2.2	1.8	2.0	(1)	.6	.4	.4	.5	(1)	.6	1.1	1.8	.2	(1)	2.1	2.1	.8	1.3
Colorado	3.2	3.4	4.0	3.3	1.7	1.0	1.0	.7	.8	1.7	4.5	1.4	1.1	.4	.4	3.1	2.8	2.2	1.6	2.2
Connecticut	1.4	.4	1.0	.4	1.0	.4	.2	.3	.3	.8	.4	.1	1.3	.1	.2	.7	.7	1.0	.4	.5
Delaware	.4	1.2	2.0	1.6	2.8	.4	.4	.4	1.6	1.2	.4	.4	.4	(3)	.4	1.5	1.2	.8	.4	.4

District of Columbia	2.2	4.5	4.7	2.7	2.6	.8	.6	.8	.5	.4	.6	.3	1.7	.5	.4	4.8	10.5	15.8	.9	2.0
Florida	(1)	3.5	3.7	5.5	3.7	(1)	.5	.1	.3	.6	(1)	.4	.4	.2	.4	(1)	3.7	.8	.5	.9
Georgia	3.4	3.8	5.2	6.0	6.0	.2	.3	.1	.3	.3	.6	.9	.5	.7	.7	1.2	2.1	1.0	.6	.4
Idaho	1.2	.6	.6	2.7	1.7	.8	1.2	2.5	1.9	(2)	.4	1.0	.8	3.2	.8	1.0	6.0	4.6	2.7	1.5
Illinois	1.9	2.2	2.6	2.0	1.7	.4	.4	.5	1.1	1.3	1.1	.9	.5	.4	.4	1.2	2.2	2.6	1.5	2.7
Indiana	1.5	2.9	4.0	3.5	4.3	.5	.6	.7	1.0	1.4	.8	.4	.3	.6	.3	1.5	2.1	2.5	.6	1.4
Iowa	.4	.9	2.1	1.6	2.1	.6	.5	.7	.8	1.4	1.5	.5	.4	.3	1.6	1.0	2.0	2.0	1.1	1.4
Kansas	1.3	2.3	2.1	2.2	2.9	1.2	1.1	1.4	1.4	2.8	1.9	.6	.5	.6	.7	1.3	1.1	2.2	1.1	1.1
Kentucky	4.6	5.1	8.3	11.5	15.3	.7	.8	.5	.7	1.0	1.1	1.2	1.6	1.4	1.0	2.9	6.2	2.6	1.6	1.4
Louisiana	3.3	4.4	5.2	4.5	4.8	.3	.2	.4	.4	.2	.9	.4	.6	.2	.4	1.3	1.8	1.0	.7	1.2
Maine	.6	.8	1.1	.8	1.7	.2	.2	.5	.5	1.0	1.8	.4	1.7	.6	.8	1.1	.9	.5	.7	.5
Maryland	1.3	1.6	1.3	1.4	1.8	1.5	1.1	.8	.8	.7	1.0	.1	.2	.4	.2	2.7	7.1	5.2	.2	1.1
Massachusetts	.4	.6	.7	1.2	2.0	.3	.3	.5	.6	.6	.5	.2	1.4	.3	.7	1.5	2.3	1.2	.6	.7
Michigan	1.5	1.1	1.2	.8	2.4	.2	.4	.3	.3	.6	1.0	.4	.7	.5	.1	.8	1.2	.9	.6	.6
Minnesota	.5	.6	.6	.7	1.0	.9	.6	.9	1.3	1.3	1.9	.2	.4	.8	1.3	.9	1.9	1.7	.8	1.2
Missouri	2.3	2.0	4.6	5.3	6.1	3.7	.8	1.0	1.3	7.8	1.9	.6	.4	.4	.4	1.2	2.0	2.9	1.4	1.5
Montana	1.5	2.1	2.8	1.9	3.0	.9	.4	.9	.9	.9	1.3	.6	.2	3.2	.4	1.3	4.3	2.6	1.7	.6
Nebraska	1.1	1.5	1.2	1.7	1.5	.9	.4	.5	.3	1.4	3.2	.7	.7	.7	.3	1.1	1.4	2.8	1.3	.6
Nevada	(2)	1.0	(2)	1.0	4.2	(2)	1.0	1.0	1.0	2.1	(2)	(2)	(2)	1.0	1.0	1.0	4.0	2.0	(2)	1.0
New Jersey	.7	.5	1.1	1.3	1.2	.6	.8	.6	.7	.9	.5	.2	.8	.3	.6	1.1	1.8	.7	.5	.6
New York	.6	.5	.8	1.0	1.2	.7	.5	.6	.5	.7	.4	.1	1.1	.4	1.1	1.2	2.2	2.2	.7	.8
North Carolina	4.8	5.5	4.6	6.2	5.9	.4	.4	.4	.5	.4	.6	.3	2.0	.4	.4	1.2	1.6	.8	.4	.3
North Dakota	1.6	1.6	3.0	3.0	2.9	.6	.7	1.1	.9	1.0	(2)	.4	.4	.6	1.3	1.8	1.0	1.0	2.3	2.7
Ohio	1.6	1.6	2.7	2.9	2.6	1.0	.8	1.0	1.0	1.0	.8	.8	.5	.5	.8	1.4	2.4	3.3	1.2	.6
Oklahoma	3.8	3.5	5.7	5.9	10.6	.3	.7	.3	.3	.6	2.3	1.4	.4	.8	1.1	1.9	3.7	2.7	1.2	2.1
Oregon	.8	.9	.5	.7	.9	1.2	1.9	1.7	1.9	.9	.7	.9	1.6	.8	1.0	.7	1.5	2.8	.3	.6
Pennsylvania	1.0	1.3	1.5	2.2	2.3	.6	.6	.7	.6	.7	.4	.2	.3	.3	.6	1.3	1.2	1.2	.7	.9
Rhode Island	.4	.1	.7	.3	1.3	.3	.3	.1	.1	.7	(2)	(2)	3.5	.1	.1	2.2	3.1	2.3	.7	.4
South Carolina	3.5	4.0	3.7	4.4	5.0	.3	.2	.4	.6	1.7	.7	.9	.7	.4	.7	1.0	2.5	1.3	.4	1.9
South Dakota	.7	.7	1.7	1.0	2.3	1.2	.3	.6	.3	.6	1.2	.1	1.0	1.4	.9	1.0	.6	.4	.4	.1
Tennessee	4.7	5.3	6.4	7.3	7.9	.8	.9	.5	.9	.8	1.2	1.5	.8	1.2	1.2	2.4	3.6	3.8	1.4	.9
Utah	1.2	1.0	1.4	.4	.6	1.0	.6	.6	1.2	1.9	1.3	.2	.2	.6	.6	1.7	3.5	1.9	1.4	2.5
Vermont	.5	(2)	1.1	.5	.8	(2)	.5	.5	(2)	.8	.5	(2)	1.9	(2)	1.3	2.3	1.6	2.1	.8	.5
Virginia	3.1	3.8	4.3	5.6	6.0	.6	.4	.5	.6	.4	.5	.4	1.6	.7	.4	4.0	5.2	3.8	1.4	.9
Washington	.9	.4	.7	.5	1.5	1.9	2.4	1.6	1.7	1.1	.5	1.0	.6	3.4	1.0	1.3	1.5	2.1	1.0	1.1
West Virginia	4.8	7.1	8.7	9.4	10.6	.2	.5	.6	.5	.3	1.1	1.2	.6	.9	1.2	4.4	5.8	3.6	2.1	.9
Wisconsin	.8	.5	.4	.9	.6	.5	.8	.8	.5	.6	1.3	.1	.2	.6	.4	.7	1.0	1.2	.7	.5
Wyoming	(2)	3.9	.9	1.7	.9	1.7	.8	1.3	1.7	.4	3.0	.4	.9	.9	(2)	2.6	2.1	2.6	2.2	1.7
Hawaii	2.4	1.6	.7	.5	1.8	.2	.7	.2	.2	(2)	.4	.2	(2)	.2	.5	.4	1.6	.7	1.9	.8
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	1.9	1.8	2.2	2.1	2.6															

[1] Data not available.
[2] No deaths reported.

TABLE 4.—*Trend of death rates for various causes per 100,000 population*—Continued

RATES PROVISIONAL FOR ALL YEARS

State	Influenza (11)					Pneumonia, all forms (107-109)					Malaria (38)*					Pellagra (62)*				
	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933
Alabama	49.9	48.5	44.3	26.1	31.8	90.2	97.8	85.7	78.8	57.6	7.9	12.2	11.4	10.4	9.6	10.7	10.7	9.1	11.1	13.4
California	(1)	11.8	8.9	5.4	14.2	(1)	72.3	63.7	56.0	63.5	(1)	(1)	.1	.1	.1	(1)	(1)	1.5	.8	.6
Colorado	49.2	32.5	32.5	25.5	36.1	167.3	131.3	113.2	107.3	95.2	------	------	.1	------	.2	.2	.5	.5	.2	.1
Connecticut	11.7	8.0	8.6	7.2	21.0	67.0	70.3	65.1	62.2	71.6	------	------	.1	------	.1	.3	.3	.1	.2	.4
Delaware	22.6	10.8	15.6	15.8	16.4	96.2	84.6	91.8	94.9	94.0	------	------	------	------	------	------	------	.4	.8	.4
District of Columbia	15.6	7.6	11.4	6.8	9.0	121.4	138.9	127.3	116.8	105.3	------	------	.7	.2	.2	.8	.5	1.3	2.1	1.3
Florida	(1)	53.5	39.2	25.6	39.4	(1)	85.5	67.8	76.0	57.0	(1)	21.0	20.2	28.5	24.5	(1)	8.1	11.1	14.3	12.2
Georgia	44.6	58.9	43.0	31.9	40.5	93.7	120.3	95.8	97.2	74.3	6.9	20.0	12.6	13.6	12.3	11.7	12.6	12.1	11.6	14.0
Idaho	39.6	19.0	17.1	14.0	18.0	77.3	110.5	95.6	97.3	70.0	------	------	.4	------	------	------	.2	------	------	------
Illinois	16.9	14.5	15.7	10.8	15.5	70.0	80.4	77.9	75.8	63.8	.5	(1)	.8	.7	.8	.2	(1)	.2	.3	.3
Indiana	32.3	28.1	24.7	21.9	29.3	91.7	97.0	86.4	83.3	65.0	.6	.1	.3	.5	.5	.5	.5	.2	.2	.2
Iowa	32.2	19.9	21.0	17.6	32.9	64.4	71.2	76.2	75.8	73.2	.1	.1	(1)	(1)	.2	.2	(1)	(1)	.1	.1
Kansas	34.0	47.3	31.2	19.5	46.5	59.5	84.3	79.4	59.2	54.2	.2	.3	.3	.3	.2	.4	.7	.3	.2	.4
Kentucky	48.2	43.3	28.8	22.8	37.3	89.2	104.4	83.9	84.8	70.6	1.3	1.8	2.5	2.2	2.9	2.6	3.1	2.6	2.2	3.4
Louisiana	53.6	49.5	24.2	20.5	33.0	105.7	120.0	87.2	74.3	65.2	8.4	11.7	17.0	17.1	20.2	4.6	5.5	6.3	6.7	9.2
Maine	37.5	24.9	20.2	18.9	41.4	93.5	96.4	84.3	83.1	75.9	------	------	.1	------	------	.1	.1	.5	.5	.5
Maryland	17.3	11.7	14.7	9.0	17.6	108.8	111.0	100.7	99.0	95.7	.1	.1	.2	.1	.1	.4	.5	.8	.6	.7
Massachusetts	9.5	6.3	7.3	6.3	13.8	92.6	88.1	89.5	82.3	91.4	(1)	------	(1)	(1)	------	.3	.3	.4	.3	.2
Michigan	17.7	12.0	15.1	11.4	18.1	84.9	85.4	80.4	73.8	58.1	------	.1	.2	.1	(1)	(1)	.1	.2	.1	.1
Minnesota	23.8	14.2	15.8	14.5	24.4	74.8	85.0	76.5	80.9	58.6	------	(1)	.1	------	(1)	.1	.1	.2	.2	(1)
Missouri	34.4	38.7	24.0	19.2	33.4	110.1	116.7	98.8	100.1	82.0	2.3	2.6	4.2	4.8	5.2	.5	.9	.4	.5	.7
Montana	55.5	24.3	42.0	26.7	36.0	104.1	121.5	122.8	82.5	63.8	------	.2	------	.2	------	.2	.2	------	------	------
Nebraska	41.1	21.3	22.7	17.8	35.1	60.8	72.0	78.2	74.9	71.3	------	------	.2	.1	.1	.2	.1	.1	.1	------
Nevada	8.9	26.0	21.2	12.2	26.0	124.8	148.0	108.1	102.0	86.5	------	------	------	------	1.0	1.0	------	------	3.1	------
New Jersey	10.0	7.9	9.2	7.3	12.2	66.4	67.7	63.2	65.9	71.1	------	(1)	.2	------	(1)	.2	.2	.1	.3	.2
New York	10.1	6.5	6.8	7.0	13.4	87.6	88.9	85.4	88.0	94.4	.2	.1	.1	.2	.1	.2	.2	.2	.2	.2
North Carolina	25.1	32.2	28.3	21.1	28.2	84.3	100.7	90.4	99.8	63.7	2.7	4.3	2.7	2.0	1.5	9.4	10.2	11.2	13.0	11.8
North Dakota	27.5	12.7	23.9	20.8	38.7	67.1	55.6	93.3	79.5	58.7	------	------	.1	.1	------	------	------	------	.3	------
Ohio	30.1	20.0	24.5	17.5	22.3	86.0	87.1	79.0	77.4	59.9	------	.1	.1	.1	.1	(1)	.4	.4	.4	.3
Oklahoma	40.1	46.1	30.8	22.0	36.6	72.4	91.5	79.3	76.2	69.3	3.3	3.7	5.5	5.6	5.4	4.0	6.9	5.1	4.2	4.4
Oregon	28.7	19.8	16.8	12.6	20.5	62.8	93.3	60.9	47.3	48.4	.2	.1	------	------	------	.1	.2	.1	.2	.2
Pennsylvania	26.6	16.1	18.1	15.1	25.1	76.5	82.5	80.0	80.0	69.8	.1	.1	(1)	(1)	(1)	.1	.1	.1	.3	.1
Rhode Island	11.0	9.1	8.5	7.9	18.2	94.7	95.9	79.4	74.9	79.5	------	------	------	------	------	.1	.1	.3	.1	.4
South Carolina	42.5	49.8	44.2	41.1	36.3	91.9	87.4	89.7	95.1	84.7	14.0	(1)	23.4	19.4	13.5	14.4	(1)	16.2	18.8	18.2
South Dakota	38.7	20.2	31.6	29.6	45.8	70.1	66.2	96.1	85.1	62.0	------	------	------	------	------	------	.1	------	.1	.1
Tennessee	44.9	54.4	39.9	34.2	38.4	93.3	117.3	95.4	89.2	75.0	3.6	(1)	7.8	9.5	10.0	6.9	(1)	7.6	8.2	8.4
Utah	24.1	21.5	22.7	16.3	23.4	63.8	95.7	92.9	98.6	61.2	------	------	.2	------	------	.2	------	.2	------	.2
Vermont	30.0	31.1	35.0	23.0	40.4	97.1	111.8	99.4	81.6	72.8	------	------	------	------	------	.3	------	.8	------	------
Virginia	38.7	38.0	35.2	25.4	35.4	94.6	94.0	78.7	74.3	63.4	.3	.6	.6	.4	.4	3.8	4.9	5.3	4.8	4.6

Washington	24.2	26.0	16.2	13.7	20.2	69.7	76.9	56.8	54.2	49.0	------	------	------	.1	------	.2	.3	.1	.1	.3
West Virginia	42.1	33.8	31.1	26.4	33.5	92.1	109.3	84.1	79.1	64.2	.1	.1	.2	.1	.1	------	.5	.7	.7	.4
Wisconsin	39.4	15.9	19.3	12.0	26.2	67.7	77.0	65.5	69.8	52.7	------	.1	(2)	------	------	.1	.1	------	.1	.1
Wyoming	46.0	24.0	26.7	16.9	28.3	115.3	113.3	91.8	55.0	47.9	------	------	.4	------	------	------	------	------	------	------
Hawaii	8.2	11.9	13.2	13.7	7.4	83.5	68.0	69.4	110.4	97.8	------	(1)	------	------	------	.4	(1)	------	------	------
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	18.0	14.7	14.7	11.4	20.3	66.3	69.8	66.1	65.0	62.5	------	------	------	------	------	------	------	------	------	------

State	Tuberculosis, all forms (23–32)					Cancer, all forms (45–53)					Diabetes mellitus (59)					Cerebral hemorrhage, apoplexy (82a,b)				
	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933
Alabama	60.4	63.9	61.2	61.1	67.3	57.2	59.2	60.3	54.0	54.4	10.4	12.3	9.1	10.4	9.4	67.0	69.2	66.2	60.0	55.2
California	(1)	76.2	75.3	77.7	78.6	(1)	144.9	140.6	134.2	130.6	(1)	24.0	25.0	22.3	23.2	(1)	85.1	84.7	80.3	84.9
Colorado	65.9	76.2	76.8	77.5	85.2	113.9	116.7	112.2	110.1	103.6	16.5	18.4	16.1	13.8	13.1	85.6	84.5	80.6	82.0	79.1
Connecticut	36.5	38.6	41.9	41.4	46.3	125.8	125.1	126.4	124.7	123.8	30.6	28.3	29.8	25.2	24.1	85.4	83.3	84.3	83.3	83.0
Delaware	55.6	49.4	62.5	62.1	72.0	118.8	122.0	114.1	112.6	119.6	29.9	29.3	30.5	26.9	28.8	113.8	113.9	109.4	113.8	120.0
District of Columbia	88.5	106.6	102.2	108.7	113.6	139.1	136.7	131.0	135.3	136.3	28.7	26.7	26.1	33.6	26.9	95.2	100.6	99.5	95.5	105.0
Florida	(1)	54.6	55.5	60.0	66.8	(1)	88.4	87.9	83.5	81.8	(1)	18.6	19.5	17.0	15.8	(1)	105.3	98.1	102.0	94.3
Georgia	49.3	55.1	55.7	57.2	58.4	57.1	56.0	54.8	56.8	53.6	12.0	12.5	12.3	12.6	11.4	83.1	82.7	76.7	74.1	70.5
Idaho	20.7	24.5	24.6	27.3	29.8	83.4	79.6	66.8	71.5	79.4	12.6	13.6	14.2	12.5	10.3	70.0	73.6	66.2	68.1	71.9
Illinois	50.7	51.6	52.1	52.7	53.8	131.2	131.1	128.4	123.7	118.6	27.1	29.2	25.3	28.0	26.3	71.6	79.1	72.8	71.9	73.0
Indiana	45.4	47.0	46.2	51.4	53.6	105.7	108.0	109.9	112.2	102.3	14.5	16.4	15.5	18.2	14.2	119.7	127.4	121.8	123.3	103.6
Iowa	20.2	22.2	25.7	24.5	25.3	124.3	120.8	126.2	123.9	121.5	21.4	23.2	21.5	24.6	19.2	103.4	105.2	105.7	108.6	110.7
Kansas	26.6	29.0	28.8	27.4	30.8	115.6	117.2	111.2	115.1	109.6	23.3	22.9	22.2	24.1	23.6	97.8	102.7	98.9	98.6	101.2
Kentucky	68.8	71.6	69.7	74.4	83.7	68.1	74.6	71.0	73.6	73.9	10.5	15.1	14.5	15.2	14.0	87.3	83.9	78.4	78.6	72.7
Louisiana	71.0	72.6	72.2	76.2	74.2	81.9	80.7	80.3	73.3	73.0	18.0	17.5	15.8	13.5	14.3	68.2	72.1	63.9	58.1	61.6
Maine	31.5	39.8	35.4	36.2	44.3	143.3	151.3	148.5	140.6	141.7	23.4	28.1	27.7	28.4	28.7	127.2	126.2	123.6	129.3	129.2
Maryland	83.4	82.9	81.1	80.2	82.2	134.4	128.7	130.3	127.6	121.0	26.3	27.5	26.8	23.9	24.0	108.1	110.6	112.3	104.8	97.0
Massachusetts	41.2	43.8	46.3	48.8	52.8	147.9	153.0	147.7	153.6	147.3	33.4	31.4	29.7	30.3	28.2	95.1	96.2	95.3	95.9	97.4
Michigan	43.9	43.9	43.2	46.9	49.6	114.4	115.7	109.6	109.9	103.5	25.9	26.5	26.0	23.5	23.3	86.9	94.8	89.1	91.5	86.9
Minnesota	33.9	35.6	34.6	34.7	37.7	140.6	133.5	131.1	130.0	130.4	23.8	25.8	22.1	22.5	20.6	86.4	86.5	82.7	81.9	79.4
Missouri	54.5	58.2	55.2	57.2	59.8	117.8	118.0	117.5	118.6	109.1	21.4	22.6	20.7	23.0	22.4	90.6	91.2	78.2	86.1	81.7
Montana	43.6	41.2	46.9	49.7	50.6	107.2	106.0	97.4	88.5	92.1	20.2	22.4	19.8	20.0	15.8	85.7	92.1	93.6	76.3	70.2
Nebraska	19.1	18.0	22.4	22.2	22.0	112.2	113.0	108.5	111.5	103.1	26.0	24.8	20.5	20.3	16.6	88.3	113.0	99.3	97.9	96.6
Nevada	85.1	88.0	108.1	90.9	91.6	70.3	95.0	89.9	98.0	85.4	13.9	13.0	13.1	17.3	16.7	74.2	69.0	80.8	69.4	86.5
New Jersey	46.4	50.2	50.1	52.6	56.5	124.8	127.4	123.8	122.7	119.2	30.3	30.6	28.6	27.3	28.9	76.3	80.8	75.9	80.5	82.0
New York	57.1	58.4	57.3	58.7	61.2	150.5	147.3	143.3	136.7	131.8	37.0	36.3	32.7	32.2	31.4	74.6	78.7	77.3	68.2	62.2
North Carolina	54.1	60.6	56.6	61.9	63.2	54.1	51.8	50.6	49.9	49.1	10.9	11.6	10.1	11.1	10.5	79.2	91.2	80.7	80.5	71.6
North Dakota	25.9	24.9	25.1	24.6	24.3	80.7	83.5	79.7	83.8	75.9	17.6	18.8	18.6	19.7	20.1	67.4	67.6	58.3	62.2	59.6
Ohio	49.4	52.9	53.8	52.5	54.5	121.3	126.4	123.3	120.4	113.9	26.4	27.4	25.9	25.1	23.8	107.8	113.8	109.2	109.8	102.8
Oklahoma	48.3	51.2	46.1	46.6	49.0	71.8	67.6	60.5	63.0	60.9	12.8	14.6	12.3	12.0	10.6	62.2	63.9	60.3	59.6	57.3
Oregon	33.9	36.5	34.5	35.7	35.4	121.5	135.1	122.9	130.2	127.8	25.0	23.3	25.0	20.5	22.4	101.9	108.4	108.0	100.3	98.8

*Leaders indicate no deaths reported.
[1] Data not available.
[2] Less than 1/10 of 1 per 100,000 population.

TABLE 4.—*Trend of death rates for various causes per 100,000 population*—Continued

RATES PROVISIONAL FOR ALL YEARS

State	Tuberculosis, all forms (23-32)					Cancer, all forms (45-53)					Diabetes mellitus (59)					Cerebral hemorrhage, apoplexy (82a,b)				
	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933
Pennsylvania	45.3	44.4	44.4	47.2	48.4	115.0	112.0	107.0	107.0	102.8	30.8	27.4	27.2	26.9	25.7	79.4	86.5	81.3	81.3	82.3
Rhode Island	46.8	47.9	51.0	46.3	51.7	156.2	145.2	147.3	137.3	140.4	42.1	33.8	33.3	33.6	35.6	98.4	98.4	96.2	92.7	99.1
South Carolina	50.4	53.2	54.3	61.0	57.3	50.3	49.4	49.1	52.7	46.7	11.5	11.0	12.2	11.9	8.0	93.5	106.2	84.3	88.8	77.5
South Dakota	37.3	34.4	39.3	34.4	38.9	84.0	88.4	89.7	85.8	83.7	19.6	21.4	19.6	22.5	19.9	69.4	81.9	78.9	74.1	79.5
Tennessee	83.0	87.5	84.3	86.7	89.8	67.3	65.8	64.6	63.0	58.2	11.2	11.3	11.5	10.6	10.2	78.8	80.3	77.4	76.8	64.6
Utah	20.4	21.5	17.5	21.4	21.8	91.3	81.2	85.2	79.6	78.4	19.1	20.3	17.9	17.5	13.5	60.3	50.0	52.8	49.2	49.7
Vermont	47.2	42.6	42.6	50.8	47.5	137.6	137.6	139.5	125.1	127.8	18.8	25.5	30.8	37.2	28.6	96.9	115.2	120.1	127.8	108.7
Virginia	60.5	66.6	69.1	68.4	73.6	70.9	71.1	72.1	70.0	68.8	16.0	15.4	15.2	16.2	14.1	88.8	95.7	95.1	90.1	92.0
Washington	46.3	49.8	51.6	47.4	53.3	132.0	133.3	132.2	128.5	120.9	23.5	25.3	23.3	21.5	22.0	102.2	103.8	98.7	94.9	92.7
West Virginia	52.5	54.4	57.3	53.7	53.3	73.6	70.6	70.9	67.0	67.0	15.1	14.6	13.4	11.3	11.3	74.0	78.6	71.2	78.6	68.0
Wisconsin	34.8	36.2	36.5	38.4	41.7	133.2	132.8	128.7	126.2	119.3	26.5	29.7	25.8	24.8	24.2	91.1	98.0	88.4	88.1	87.1
Wyoming	18.7	18.0	25.0	18.6	30.4	76.6	73.8	67.2	74.9	71.7	11.1	15.4	17.2	10.4	13.5	84.2	74.2	65.9	64.1	53.0
Hawaii	70.8	78.0	68.5	76.9	99.6	66.5	62.9	62.1	57.1	68.6	15.6	16.9	15.1	15.7	15.8	40.6	43.7	39.8	36.6	49.7
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	51.3	54.3	55.8	59.4	64.7	94.1	93.9	96.1	96.1	94.6	25.0	24.7	24.4	24.4	24.1	59.0	61.9	61.2	63.2	63.8

State	Diseases of the heart (90-95)					Nephritis, all forms (130-132)					Diseases of the digestive system (115-129)					Diarrhea and enteritis under 2 years (119)				
	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933
Alabama	161.9	147.4	135.8	142.2	121.4	78.0	79.3	79.9	77.6	76.3	64.1	68.0	61.8	72.9	69.0	15.5	17.5	15.2	19.9	18.2
California	(1)	333.6	320.5	293.8	282.4	(1)	83.4	82.6	78.9	80.9	(1)	84.2	77.8	75.4	71.7	(1)	10.4	7.4	9.4	8.7
Colorado	210.0	250.0	240.1	211.4	202.7	79.5	84.3	78.8	83.3	68.0	83.1	101.7	100.5	101.7	95.8	26.6	23.6	17.2	20.7	17.9
Connecticut	234.6	238.4	221.7	213.8	205.3	77.5	84.8	86.8	85.6	83.5	47.6	51.3	56.1	56.0	57.2	3.0	2.6	1.7	5.0	4.6
Delaware	363.6	346.3	331.3	354.5	333.2	136.0	119.3	111.4	119.0	146.8	72.0	68.3	69.9	75.1	72.8	9.6	15.4	19.1	13.8	14.0
District of Columbia	327.1	338.4	330.6	347.3	312.0	98.2	96.9	100.7	111.6	117.5	79.9	84.2	90.2	93.2	102.4	11.6	15.0	9.9	12.7	10.5
Florida	(1)	238.4	214.7	222.9	194.9	(1)	104.4	104.8	118.3	115.1	(1)	85.4	93.2	93.9	83.6	(1)	9.5	12.8	13.6	8.3
Georgia	167.3	180.1	163.7	161.8	130.6	107.7	108.3	100.8	105.5	102.3	67.2	72.6	72.5	80.3	70.7	15.2	17.5	15.8	21.3	16.2
Idaho	150.7	186.4	159.1	149.9	155.6	37.5	25.2	34.9	34.2	33.9	71.8	64.7	60.5	74.8	58.8	9.1	7.2	4.4	11.0	6.7
Illinois	301.5	317.6	276.7	270.0	256.6	95.4	102.0	96.8	104.7	103.5	68.9	72.6	69.1	75.9	71.1	4.5	6.5	4.4	8.4	6.4
Indiana	243.9	265.5	254.2	264.4	173.0	63.4	74.3	64.7	75.1	71.5						8.5	8.9	6.3	12.0	10.7
Iowa	220.5	231.7	225.7	206.4	193.9	58.3	59.9	62.3	65.6	40.5	54.8	56.9	61.0	65.4	55.8	3.2	4.4	3.9	6.8	2.7
Kansas	224.8	241.8	217.0	207.4	196.8	87.2	97.1	92.4	96.5	95.2	62.5	72.2	70.7	79.3	74.2	6.1	6.8	6.5	8.3	8.7

Kentucky	165.2	207.1	185.3	183.5	162.1	66.0	76.2	72.8	80.1	78.5	71.9	84.0	74.9	87.5	80.9	22.2	30.0	21.7	29.4	24.1
Louisiana	211.6	232.0	206.7	202.4	191.2	104.3	105.4	105.8	110.1	97.5	74.8	84.8	82.7	80.4	78.8	16.5	18.2	17.8	22.0	19.4
Maine	359.5	344.4	326.4	308.5	315.2	81.3	87.1	87.1	87.1	96.6	59.0	66.2	78.3	73.4	70.9	14.0	6.0	12.9	11.8	9.3
Maryland	313.8	304.6	273.5	270.7	261.0	138.6	142.4	137.4	141.1	147.2	69.0	70.3	70.8	71.1	72.5	13.8	16.1	14.0	17.7	17.1
Massachusetts	359.2	358.7	337.1	331.8	327.2	69.0	73.5	76.3	78.7	82.1	59.2	61.5	61.1	65.1	63.9	2.7	3.5	5.2	4.7	4.0
Michigan	272.8	278.9	262.8	251.0	242.2	60.6	63.5	62.9	66.1	63.6	65.6	75.2	67.3	74.6	69.0	5.8	9.8	4.5	8.2	6.2
Minnesota	232.4	244.0	213.9	213.0	197.2	45.4	48.1	48.4	51.7	54.5	56.0	62.2	63.2	68.3	61.4	2.8	4.6	3.8	4.0	4.9
Missouri	254.2	260.3	229.7	240.3	227.3	99.3	115.6	111.4	116.3	108.8	62.2	84.6	73.0	89.6	78.8	10.9	15.1	11.6	16.4	13.5
Montana	220.8	193.8	205.5	179.3	180.1	58.1	65.3	66.8	65.9	69.2	73.5	88.5	94.0	84.2	74.7	7.0	11.5	8.1	13.4	5.1
Nebraska	219.9	220.6	189.7	189.6	178.9	63.1	69.6	51.5	60.6	58.3	61.4	74.6	65.6	72.7	65.3	4.0	4.8	3.7	5.6	4.8
Nevada	255.4	290.0	218.2	249.0	249.0	46.5	84.0	100.0	83.7	91.7	72.3	104.0	104.1	100.1	103.2	5.0	7.0	7.1	18.4	10.4
New Jersey	308.8	301.9	285.1	284.6	268.0	70.3	75.6	79.0	82.6	85.7	57.2	58.2	57.0	59.3	62.4	3.2	3.4	3.4	5.2	4.3
New York	360.9	349.8	318.4	322.6	299.1	75.5	78.7	80.3	84.5	79.1	67.6	68.3	67.0	69.4	71.3	5.9	6.1	6.2	6.8	7.0
North Carolina	158.3	175.1	155.7	161.2	141.4	81.5	98.1	90.5	98.5	87.2	71.0	64.9	63.9	73.3	65.7	24.6	23.5	22.0	26.6	20.6
North Dakota	163.7	160.6	146.0	154.4	143.0	35.6	41.7	47.4	41.0	47.3	54.8	67.5	65.5	74.7	63.8	10.0	12.2	10.4	14.8	12.1
Ohio	284.9	282.8	262.8	255.4	240.8	78.8	84.4	81.5	81.9	78.5	67.6	73.2	69.2	74.8	73.2	8.2	8.3	6.0	8.0	8.5
Oklahoma	129.5	136.9	121.4	112.0	114.2	61.8	58.0	52.6	49.1	44.7	65.1	70.7	67.0	77.8	74.4	13.0	15.3	13.1	18.3	16.8
Oregon	273.3	277.4	277.5	254.0	255.2	106.6	104.3	103.7	91.6	87.2	52.3	66.2	63.0	59.7	57.8	1.6	2.3	1.8	1.7	1.6
Pennsylvania	301.9	292.8	271.7	263.3	244.9	84.5	82.0	83.1	88.7	92.6	55.5	53.7	55.7	60.7	62.2	6.0	5.8	5.5	8.3	8.6
Rhode Island	368.0	355.1	328.3	312.3	289.3	108.5	107.2	103.8	111.7	117.0	60.6	61.2	66.2	62.7	68.2	5.1	3.8	5.3	4.3	4.4
South Carolina	185.2	177.8	178.4	168.6	160.9	92.0	93.8	93.5	108.0	81.8	29.8	41.6	63.2	75.2	70.2	9.8	16.2	22.1	27.8	23.8
South Dakota	167.0	153.6	139.6	146.0	147.4	44.1	60.5	61.1	63.0	50.9	54.5	60.4	59.0	66.2	57.9	4.6	10.1	7.8	9.4	8.2
Tennessee	158.0	161.3	142.6	144.0	111.1	65.2	67.9	63.1	62.0	60.5	75.2	80.3	77.9	87.8	85.0	17.6	20.4	18.9	25.4	23.3
Utah	227.9	218.4	202.5	193.8	176.2	57.2	58.5	58.3	58.8	55.4	67.8	78.0	80.6	80.4	78.6	3.8	9.9	4.9	9.3	5.3
Vermont	311.2	356.3	313.0	330.2	314.3	72.6	88.2	88.3	101.6	94.6	47.8	69.2	63.9	71.3	75.9	2.6	5.3	3.4	5.0	4.6
Virginia	219.2	231.4	208.0	205.8	183.3	83.5	91.5	86.3	87.3	85.0	51.7	57.8	55.4	62.1	58.4	12.3	13.3	10.8	16.3	15.3
Washington	301.9	277.0	264.6	244.3	236.0	75.3	74.3	79.2	75.2	71.9	57.8	66.3	65.3	63.1	61.5	3.2	3.3	3.7	2.8	2.5
West Virginia	166.2	170.5	150.2	124.3	116.2	66.4	67.3	69.5	64.9	78.0	71.6	92.1	76.8	79.8	82.5	21.3	34.3	20.1	28.0	32.7
Wisconsin	282.5	290.8	256.4	239.9	229.3	68.9	68.8	70.0	69.8	67.3	------	------	------	------	------	4.7	6.2	4.6	6.8	6.8
Wyoming	254.0	207.3	184.9	163.6	160.9	31.5	53.2	55.2	59.7	55.6	73.6	80.7	75.9	74.4	77.4	14.0	11.6	3.9	7.8	6.1
Hawaii	107.1	119.4	100.5	92.8	115.9	64.5	62.2	67.3	61.7	77.0	59.2	64.8	64.2	74.9	103.0	17.0	20.1	18.6	27.2	36.5
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over [1]	157.0	161.0	158.1	162.9	161.5	54.6	59.4	60.2	64.9	67.1	------	------	------	------	------	6.6	6.1	5.8	8.1	7.5

[1] Data not available.

[4] Heart diseases in the data for industrial policyholders excludes pericarditis, acute endocarditis, acute myocarditis, and angina pectoris; nephritis data for industrial policyholders include only chronic nephritis.

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TABLE 4.—*Trend of death rates for various causes per 100,000 population*—Continued

RATES PROVISIONAL FOR ALL YEARS

State	All accidents (176–195, 201–214)					Automobile accidents (206, 208, 210)				
	1937	1936	1935	1934	1933	1937	1936	1935	1934	1933
Alabama	72.7	70.2	63.6	61.5	57.7	23.4	24.1	21.0	18.4	18.1
California	(1)	(1)	98.0	95.1	88.9	(1)	(1)	46.0	46.8	39.5
Colorado	94.5	103.1	94.3	89.6	88.3	35.9	36.3	31.2	32.4	30.1
Connecticut	68.4	69.7	72.7	75.5	66.9	24.0	25.7	28.1	28.2	28.0
Delaware	106.5	93.4	96.1	94.1	86.8	42.9	33.6	28.1	34.4	34.4
District of Columbia	82.3	82.0	83.8	93.4	80.7	27.8	33.6	27.8	35.4	26.2
Florida	(1)	102.3	119.2	99.7	88.4	(1)	41.6	39.1	39.3	34.7
Georgia	75.3	90.5	79.3	74.8	66.8	29.6	32.3	30.8	26.8	22.7
Idaho	104.5	111.4	92.1	88.8	80.2	36.7	38.4	34.0	33.0	26.7
Illinois	80.8	99.9	73.5	83.4	72.4	33.1	32.2	29.1	31.8	27.5
Indiana	86.8	105.1	84.5	92.1	85.2	39.3	39.5	35.1	37.0	33.6
Iowa	75.1	87.1	74.9	78.8	70.6	23.9	22.1	24.5	22.7	22.3
Kansas	114.2	95.0	85.9	93.9	82.4	26.9	30.6	31.5	27.9	27.8
Kentucky	71.6	85.8	77.2	78.6	71.3	26.1	23.8	23.7	23.1	19.1
Louisiana	69.4	78.2	73.6	69.4	68.2	22.6	27.2	24.5	23.0	18.9
Maine	74.2	83.5	82.2	83.0	81.1	18.6	24.3	24.8	25.1	24.1
Maryland	92.2	84.9	85.1	83.6	78.7	32.2	27.6	28.0	30.1	30.0
Massachusetts	63.9	69.0	68.7	70.3	64.0	18.9	20.2	19.3	23.4	19.0
Michigan	92.2	99.7	82.7	82.1	71.6	41.0	40.1	35.2	32.5	27.3
Minnesota	75.0	97.8	75.2	74.8	73.8	24.8	26.8	23.7	25.2	22.0
Missouri	79.2	95.4	74.2	98.8	67.8	27.7	25.6	24.7	26.0	21.6
Montana	108.0	124.3	104.0	108.5	95.3	33.2	32.4	30.0	39.0	22.3
Nebraska	66.5	77.9	82.3	79.1	66.9	24.0	22.8	25.6	23.6	22.3
Nevada	157.3	184.0	177.8	180.6	157.2	59.4	74.0	80.8	73.5	65.6
New Jersey	72.1	72.4	69.0	74.1	70.9	26.6	25.8	27.6	28.6	27.8
New York	72.6	71.4	70.7	73.1	70.2	22.6	20.4	22.3	23.4	22.7
North Carolina	72.0	71.4	70.6	69.4	60.3	29.9	28.1	29.4	27.4	23.1
North Dakota	58.9	64.1	55.7	56.6	55.6	19.3	19.2	15.7	18.6	16.9
Ohio	94.6	103.2	91.9	95.1	85.9	36.9	35.8	35.5	34.5	30.2
Oklahoma	61.5	76.2	68.9	65.0	58.7	24.2	25.8	26.5	24.5	20.5
Oregon	89.7	109.6	95.9	88.5	79.4	33.2	35.7	28.8	31.8	26.9
Pennsylvania	66.1	76.6	72.2	75.0	72.0	21.6	24.0	23.4	25.4	23.0
Rhode Island	55.9	58.3	60.4	56.4	55.2	18.1	16.5	15.8	15.1	14.2
South Carolina	87.8	75.2	71.9	70.0	59.7	27.9	31.4	27.7	26.2	19.7
South Dakota	60.3	70.5	63.9	62.1	61.3	15.9	18.5	21.4	17.6	17.2
Tennessee	68.3	77.2	72.5	73.0	65.9	24.5	27.2	25.3	25.0	22.9
Utah	98.4	92.1	91.9	85.4	72.1	38.9	35.9	36.5	37.9	27.1
Vermont	65.5	82.3	92.9	92.7	80.1	17.0	26.3	22.6	26.2	19.4

Virginia	70.8	83.4	82.1	83.5	72.8	28.0	31.2	32.2	29.8	23.8
Washington	99.0	111.4	99.4	98.3	87.7	33.0	38.5	34.6	37.3	28.3
West Virginia	95.1	104.0	99.2	98.2	84.4	24.8	28.0	28.2	23.4	21.8
Wisconsin	83.6	91.2	77.1	75.6	70.8	29.9	26.6	28.6	25.3	23.0
Wyoming	128.9	131.3	124.6	127.7	102.6	53.2	48.9	43.5	47.6	37.8
Hawaii	51.1	[1]	65.0	65.4	55.4	15.0	[1]	18.4	22.7	19.3
Industrial policyholders, Metropolitan Life Insurance Co., ages 1 and over	53.6	57.7	54.5	57.8	55.6	20.9	20.1	20.3	21.1	19.8

[1] Data not available.

TRENDS IN SHELLFISH SANITATION[1]

By H. N. Old, *Sanitary Engineer, United States Public Health Service*

By specifying the word "trends" in connection with shellfish sanitation the program committee has conferred upon this public health activity quite an honor. In fact, all of us who are interested in the subject should derive much encouragement. It clearly indicates that the activity is shedding its garments of infancy and donning the raiments of maturity.

While several of the States, notably Rhode Island, New York, and New Jersey, and the Federal Food and Drug authorities did exercise some control over shellfish production and handling prior to 1925, it is quite obvious that the widespread epidemic of typhoid fever which included some 1,500 cases in Washington, Chicago, New York, and several smaller cities in the fall of 1924 brought on what might be termed a New Deal in shellfish sanitation in 1925. Therefore, shellfish sanitation as a major public health engineering activity is only in its thirteenth year. We have progressed rather steadily, but as custodians of this responsibility we find much to be accomplished in the future.

In confining the definition of "shellfish," for the purpose of this paper, to oysters and all varieties of clams there is no intention to discount the problems incident to the production and handling of scallops and the danger of toxic poisoning from mussels at certain times of the year, chiefly on the Pacific coast. However, oysters and clams are of more general concern owing to their comparatively wide distribution and the frequency with which they are consumed uncooked.

The discussion of trends will be taken up under the three major classifications of greatest interest to the public health engineer; namely, (1) Field Survey, (2) Laboratory, and (3) Administration.

FIELD SURVEY

This classification may be broken down further into (1) production areas, (2) wet storage or "floating," and (3) handling, packing, and shipping.

Production areas.—Since 1925 it is quite unlikely that any natural shellfish-growing area in the country has escaped close scrutiny on the part of State or Federal officials or both through sanitary survey and laboratory examination. In fact many areas have been resurveyed several times. This has resulted in the classification of areas (*1*) somewhat as follows:

Approved areas.—Areas so protected against human fecal contamination by distance from source of such pollution, by dilution, and by

[1] Presented at the Sanitary Engineers and Sanitation Officers Section Meeting, Southern Branch, American Public Health Association, New Orleans, La., November 30, 1937.

time afforded for natural purification that chance of dangerous contamination is remote.

Grossly polluted—Restricted areas.—Areas definitely banned for the taking of shellfish, due to gross pollution by reason of sewage discharge directly to the area, continuous exposure to even slight direct contamination with human fecal discharges from nearby sources, or areas, though usually of good quality, which are exposed to occasional direct and immediate contamination with such discharges.

Moderately polluted—Restricted areas.—Areas intermediate between these two with respect to exposure to and protection against fecal pollution. Of course, it is this class that always will require the greatest study of sanitary survey and laboratory findings. Under certain conditions the taking of shellfish from these areas may be permitted if subjected to biological cleansing such as wet storage in chlorinated or safe water or under certain temperature conditions which may afford some relative protection through hibernation.

With respect to bacteriological examination of the overlying water it is the tendency to associate with approved areas laboratory findings of organisms of the *coli-aerogenes* group in 50 percent or less of the 10 cubic centimeter portions, or a score of approximately 0.3. For grossly polluted areas presence of this group in 50 percent or more of the 0.1 cubic centimeter portions, or a score of 32, is deemed consistent, while such finding in 50 percent or more of the 1 cubic centimeter portions, a score of 3.2, would weigh heavily against the moderately polluted areas. However, with less than 50 percent of the 1 cubic centimeter portions positive, approval of the area may be considered.

However, owing to dissatisfaction on the part of most officials relative to the present bacteriological yardstick in use it is quite apparent that, in passing judgment upon a moderately polluted area, the trend, when in doubt, is to place more reliance upon the sanitary survey findings. In this respect, it is quite logical that, with possible illness and death in the balance, any such hair-line decision on the part of a public health official will be against the area. It is seldom that members of the shellfish industry will take issue with this policy.

The problem of pollution has been complicated not only by the increasing contamination of our coastal streams but also by exhaustion of formerly productive natural shellfish areas with consequent need of cultivation of new areas. In this there is a tendency to locate the new areas as close as possible to the labor supply and to shipping facilities. This feature will require vigilance on the part of health authorities.

With respect to the relaying of shell stock from questionable to safe areas, the requirements are being modified to a minimum relaying period of 7 rather than 15 days when the water temperature of the relaying area is above 50° F., but prohibiting relaying entirely when

such water temperature is below 50° F., providing further that no removal of shell stock from grossly polluted areas be permitted for relaying during the open market season.

Wet storage ("floating") and cleansing plants.—Considering the unanimity of opinion to the effect that the "floating" or storing of shellfish in water subject either to periodic or constant contamination is the one practice which probably has resulted in doing more injury to the industry than any other single practice because of disease outbreaks (*2*), it is quite logical that more attention and study have been given this feature.

Among reasons for this practice are the balancing of a fluctuating market, availability of product regardless of inclement weather, freshness of product, and elimination of sand and grit from the shells.

Some attempt had been made by the States to restrict this practice, although it was not until the epidemic of 1924 that any vigorous steps were taken. Since that time, despite sanitation of "floating" areas by provision of chemical toilets and other facilities tending to reduce the chances of pollution, it has been the tendency on the part of public health officials to look with much disfavor upon any system requiring enforcement of police regulations to safeguard the sanitary quality of natural areas in which shellfish are frequently stored. The definite trend along this line is indicated by the recommendation of the Committee on Shellfish of the Engineering Section of the American Public Health Association of October 1936, as follows: "It is the consensus of opinion of this Committee that water storage should not be practiced or permitted in any area subject to either direct or intermittent pollution as disclosed by a sanitary survey. Water storage should therefore be practiced only under conditions in which the sanitary quality of the water is under the most rigid control at all times." The latter specification with respect to artificial bodies of water, such as tank treatment for storage or cleansing, infers that the entering water be of bacterial quality at all times at least equal to the United States Treasury Department standards for drinking water (*1*).

It is believed that there will be provided by the industry numerous tank conditioning plants for shellfish by which the product will be stored in suitably designed concrete tanks using water of approximately the same salinity as that of the growing area and of assured safety. Several plants of this kind are being operated very successfully utilizing chlorine for sterilization of the entering water and providing oyster storage of sufficient duration to accomplish the desired conditioning. An experimental plant of this type in Virginia (*3*) has shown excellent results and indicated *coli-aerogenes* reductions of not less than 95 percent in 30 hours at a temperature range between 49° and 53° F. Other plants of similar type are being operated for

the conditioning of either oysters or clams, or both, notably those at Newburyport, Mass., (*2*) and West Sayville, Long Island, N. Y. (*2*).

No doubt in the future other moderately polluted areas will be saved by the use of conditioning plants financed and operated by coastal municipalities or groups within the shellfish industry but rigidly supervised by State health authorities.

Handling, packing, and transportation.—While there have been no radical departures in these requirements from the recommendations of the Committee on Sanitary Control of the Shellfish Industry, of February 1925, upon which are based in general the various State regulations as well as the United States Public Health Service Minimum Requirements, there are being adopted several noteworthy revisions.

One of these will prohibit the use of the so-called "Sealshipt" container, a 5-gallon heavy metal can, oval in shape, with a fill-and-empty hole in the middle of the top. The construction of these cans rendered adequate cleansing almost an impossibility.

Another modification in the Federal Minimum Requirements will be the approval of shipping containers of a type described as "non-returnable, nonreusable shipping containers of waxed paper." A rather satisfactory heavy waxed-paper gallon container has been so devised that the removal and replacement of the top without detection is almost impossible.

It is believed that a tendency exists in some States to modify the requirements relative to compulsory medical examination certificate for each employee. Those of us who have been directly connected with shellfish sanitation supervision have been impressed frequently with the lack of value of the medical certificate usually tacked up in a packing plant or filed away in the operator's desk. No doubt New York City in its three and one-half million laboratory examinations of food handlers in 18 years is in position to pass judgment on this matter and did so 3 years ago in discontinuing the practice.

In this connection, Dr. Knowlton, of the Connecticut State Department of Health (*4*), aptly states that "The problem of food handlers is one to be solved by education rather than by legislative requirements of routine examinations. The essential point is to keep sick people from handling food, and this can be accomplished better by the employer having employees examined when they are ill rather than at regular intervals. General cleanliness and sanitation, and especially thorough washing of the hands, are also essential elements in solving the problem of food handlers."

Of course, all applicants for employment in a shellfish plant should be examined by the employer for open lesions on hands, arms, or face, and questioned relative to evidence of previous typhoid or paraty-

phoid fever and referred to a laboratory for examination if such evidence is found.

Another commendable trend is that suggested by the New York State Conservation Department's recent adoption of three tag forms, known as "free bay-men's daily lot tag," "shippers' tag," and "split lot tag." These will allow administrative authorities at any point in the chain, by simply observing the tag attached to the shellfish, to learn the source of the product and the various steps through which it has passed up to the point of observation without the necessity of going back through the book records of the various persons or concerns, through whose hands the shellfish may have passed.

Adoption by producing States of a uniform set of tags of this sort will greatly facilitate the tracing and identification of shellfish shipments. In fact, the recent revision of the Public Health Service Minimum Requirements includes this policy.

LABORATORY

Probably the most vital need in shellfish sanitation at present relates to the laboratory features. Much dissatisfaction is voiced among the majority of officials engaged in shellfish sanitation over the present Standard Methods of Shellfish Examination. Some 20 to 25 years ago a very able committee of the American Public Health Association conducted some valuable studies, and reported upon them in 1912 and 1916; and the result, with a few minor changes in phraseology in 1922, is the basis of our present Shellfish Standard Methods. However, in the interim, subsequent studies and practical experience have amply demonstrated the inadequacies of these methods, although most official laboratories are using them simply because they are "standard."

We are, and have been for years, using as index of pollution in judging the safety of oyster areas the so-called *coli-aerogenes* group, whereas many authorities favor the use of a more specific indicator such as *Escherichia coli*, the true colon bacillus. The Eijkman test for this bacillus, however, has been deemed unsatisfactory by some authorities. As there does not seem to be entire agreement upon these points, it is evident that much further research study will be necessary prior to any radical departure from our present indicator.

Another desirable departure upon which there appears to be general agreement is that of using the McCrady table of "most probable numbers" of the indicator adopted per 100 cubic centimeters, rather than the present arbitrary assignment of a score to interpret certain results.

Furthermore, should we continue to examine only oyster shell liquor or use body meat in addition or body meat only? Other questions

of this nature are in need of discussion in order to bring up to date the laboratory procedure with respect to shellfish sanitation.

Dr. C. A. Perry, referee of the A. P. H. A. Committee on Bacteriological Methods, submitted questionnaires to 68 interested persons in 1935, and he states (*5*) that "on the basis of questionnaire, conference, and consideration of studies made both in the United States and certain foreign countries, the following principal changes in the present standard procedure for the examination of shellfish are proposed:

"1. The new procedure should include at least such edible mollusks as oysters, clams, and mussels.

"2. *Escherichia coli* rather than the colon group should be the index of pollution for both shellfish and shellfish waters.

"3. A new procedure should include methods for the examination of shellfish waters as well as shellfish.

"4. The whole oyster rather than just the shell liquor should be examined.

"5. *Escherichia coli* results should be expressed as most probable numbers rather than as a score.

"6. Certain recommendations should be made in regard to amount of pollution which should ordinarily be tolerated."

The quotation of these proposals is in no sense an endorsement of them. However, intensive study on the part of those in a position to conduct such research on a representative scale will be of great value. It is understood that some studies of this nature are now under way.

ADMINISTRATION

Legal.—Trends in nearly any activity that concerns commerce or industry are necessarily influenced more or less by legal decisions. Therefore, reference to several court decisions of the last few years may be of interest.

Owing to the pollution of certain tidal flats by domestic sewage from 11 cities and towns in the Merrimack Valley, the construction of a chlorination plant for the treatment or conditioning of clams from these flats was found necessary. In response to an order of the Supreme Court of Massachusetts a commission allocated plant costs by taking the daily water consumption and the figure representing the population of each community contributing to the pollution, dividing each by a figure equivalent to double the distance in miles from the community to the clam areas, and averaging the resulting percentages (*7*). It is assumed that none of these communities had provided sewage treatment; therefore, the amounts and distances were the only controlling factors.

However, in the case of a plaintiff in Connecticut, who owned certain oyster grounds under the tidal waters of Long Island Sound in Norwalk Harbor, a substantial part of which had been acquired since 1925, the State Supreme Court of Errors upheld the trial court

in denying relief against the city of Norwalk. In this case sewage had been discharged from Norwalk into the tidal waters for more than 50 years, and the plaintiff, having been in the oyster business in Norwalk for more than 30 years, was entirely familiar with the prevailing method of sewage disposal and its effect upon tidal waters. It was stated by the court "that the acts found were confined to tidal waters and did not constitute a public nuisance; that the plaintiff or his predecessors in title received their grants of oyster grounds subject to the public right of employing tidal waters for drainage purposes, and the exercise thereof by the defendant was not in derogation of any right enjoyed by the plaintiff" (*8*).

Legal backing of the State certification of shellfish plants has been well established in Rhode Island. In proceedings before the supreme court of that State to review the action of the State Commission of Shellfisheries in revoking a certificate of sanitary condition, the petitioner contended the commissioners were without jurisdiction to revoke his certificate on the grounds of "having in his possession quahaugs under legal size, purchasing shellfish from unlicensed fishermen, keeping inaccurate records of the purchase of shellfish, and handling shellfish from areas not approved by the commissioners" inasmuch as there were no findings that his premises were not in a sanitary condition. The general laws, however, provide for the making of "all necessary regulations for enforcing the laws of the State relating to shellfisheries and for executing the duties imposed upon them by law." The applicant had also agreed to "handle, ship, or offer for sale only such shellfish as had been obtained from beds examined, and approved by the Board" as a prerequisite to issuance of a certificate of sanitary condition. The court held this to be a reasonable exercise of the power to make rules and regulations and concluded that "as there was competent evidence tending to prove that the petitioner had violated his agreement, the action of the commissioners in revoking his certificate will not be reviewed" (*9*).

General.—One of the encouraging features with respect to the administrative phase of shellfish sanitation has been the gradual trend toward centering supervision and responsibility in the various State departments of health. Surely the problems are almost wholly of public health nature and it is reasonable to expect that the health departments are best equipped to assume these responsibilities.

In most instances the supervision is being placed under the State health officer, with other departments cooperating, such as the conservation department in connection with the provision of water transportation and patrol of condemned or restricted areas.

Another feature which has been largely instrumental in whatever protection the health authorities have been able to provide the consumers of shellfish since 1925 is the whole-hearted cooperation on the

part of the majority of members of the shellfish industry, nearly all of whom are only too glad to aid in maintaining a high standard of sanitation under the guidance of their respective State health departments.

Recent evidence of this spirit is the action of a group of oyster house operators meeting in Florida in September. According to the Florida bulletin (*6*): "Before adjournment, representatives of the oyster industry drew up, for passage by the group, a set of minimum standards which will govern plant operation during the season. These requirements are in accord with State board of health regulations but in addition include items of specific interest and benefit to local plant operators."

In conclusion, it is desired to point out what appears to be the weakest link in the chain of effort on the part of the health authorities of shellfish producing States and the United States Public Health Service to assure a reasonably safe product to the consumers throughout the country. Reference is made to the certification policy by which the producing States exercise sanitary supervision over the industry and certify to the Public Health Service the establishments meeting the requirements. The Public Health Service, after assuring itself of the efficacy of State supervision, endorses these certificates and distributes the information at semimonthly intervals throughout the country and to Canada through State and local health authorities.

There is every indication that these lists receive very little attention in most instances on the part of local health authorities—not in all instances, however, as some city and even county health officers are on the alert to exclude from their jurisdictions shellfish not properly identified as to approved origin.

On the whole it is quite evident that interest in shellfish as a safe food product is stronger on the producing than on the receiving or consuming end of the line. If this lack of attention continues in the inland communities it will soon react upon the authorities at the site of production.

Let us hope that the recent increase in State and local health department personnel will stimulate closer supervision over local food markets, restaurants, and hotels dealing in shellfish. Where full-time health units are in operation in cities or counties, there certainly seems to be no excuse for allowing either shucked or shell oysters of unapproved origin to reach the local markets. If the health officer is not receiving the semimonthly list, he should request it by applying to the State health officer or directly to the Surgeon General, and should see that his food division or sanitary officer, during the shellfish season, checks the local supply frequently.

In fact, should an outbreak of gastrointestinal disease occur in his jurisdiction that may be traced to shellfish from an unapproved source, that health officer may be placed in a position of serious official embarrassment.

The development of more rigid control at points of consumption will be a most valuable trend in this public health activity.

SUMMARY

1. Classification of oyster and clam growing areas is discussed from the standpoint of safety.

2. The hazards of "floating" or wet storage are pointed out unless under very rigid control of the water in which shell stock is relayed.

3. The experience thus far and future prospects in the use of shellfish cleansing or conditioning plants are discussed.

4. Certain developments in items of shellfish handling plant sanitation are described, such as shipping containers, identification tags, and medical examination of employees.

5. The trend toward revision of Standard Methods of Shellfish Bacteriological Examination is referred to in some detail, particularly the need of a more specific indicator of fecal pollution and the use of "most probable numbers" rather than score in the interpretation of laboratory findings.

6. Administrative trends are discussed referring to certain legal decisions, concentration of supervision in State health departments, cooperation of the industry, and the need of closer cooperation on the part of health authorities in the so-called consuming States.

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PLANNING THE ORGANIZATION AND CONDUCT OF STREAM POLLUTION SURVEYS[1]

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Surveys to determine the sanitary condition of polluted streams may be undertaken for any one or a combination of several purposes. The nature of the organization required to conduct such a survey, as well as the survey itself, is, then, very largely dependent upon the kind of information desired. It is therefore highly essential that a clear and complete statement of the objectives be agreed upon first; then the plans for the survey can be built around these requirements. It is not possible to enumerate all of the purposes which stream surveys may be designed to accomplish, but they include the securing of specific information to ascertain:

1. The nature and extent of nuisance conditions resulting from odors, sludge deposits along channels and shore lines, floating sleek, grease and oil and objectionable discolorations, and aquatic growths.

2. Suitability of the stream waters for public or industrial water supply, including the possibilities and probable costs of treatment, chemical and biological characteristics, and adequacy of flow.

3. The capacity of the watercourse for sewage or industrial waste dilution, which is dependent on volume and constancy of flow, extent of the oxygen reserve, degree of sedimentation in the channel, and rates of recovery from pollution.

4. Ability to support fish and other aquatic life as it may be affected by the content of toxic substances, the oxygen balance, and existence of plant and other fish food.

5. Safety for recreational use, which involves the relative freedom from pathogenic bacteria and suspended solids.

6. General relationships of pollutional factors for application to a variety of specific conditions. These relationships include the correlation of known populations and industrial wastes with water quality of the receiving stream, the rates of recovery from determinable pollution under known conditions of depth, velocity, and temperature of the flowing water and the nature and direction of changes in the bacterial, biological, and oxygen content and their interreactions.

The information needed to fulfill these general requirements falls into one of three general classes. The first class deals with the nature, location, and extent of sources of pollution of the stream under investigation, the securing of information on which involves a sanitary survey of the watershed to determine the distribution of the population both sewered and unsewered, the extent of sewage treatment, the location, types and volumes of industrial waste contributions and

[1] Presented at the Ohio Conference on Sewage Treatment, Cincinnati, Ohio, October 19-20, 1937.

similar matters. The second general class of information embraces the hydrometric factors, such as the daily volume of flow of the main stream at definite points and of the tributaries at their mouths, the times of flow between different locations, and the records of rainfall and its relation to runoff. The third type of essential data is concerned with the sanitary condition of the water and sediments throughout the channel under varying conditions of stream flow, temperature, and season. The securing of this class of information usually involves laboratory examination of a variety of samples over an extended period of time.

The relative amount of time to be spent on the assembling of information of these three general types will be governed very largely by the specific objectives of the study. The nature of the organization, in turn, will depend upon the emphasis to be placed on these respective classes of data. It will depend further upon the extent of information readily obtainable from existing governmental agencies, Federal, State, and municipal, which in many cases will be found to have extensive collections of pertinent data. Close contact and cooperation with such agencies is, therefore, highly essential in any stream pollution survey, and time will be well spent in first assembling and correlating this available material. Frequently, also, active cooperation can be obtained from these organizations, particularly when the results can be made of value to them.

ORGANIZATION

Because the complete stream survey requires a wide variety of technical knowledge, the personnel employed will be composed of a number of professional groups, including sanitary engineers, bacteriologists, chemists, and biologists. The amount of service required of each of these groups will depend upon the extent of the particular problem and the thoroughness of the survey. Proper facilities for the collection, review, and filing of collected data are essential for orderly work. Adequate time should be permitted for the critical study of the accumulated material and preparation of a comprehensive report following the conclusion of actual field work. The entire activity will be judged largely by the thoroughness of the finished product—the report, which constitutes the only generally available permanent record.

CONDUCT OF THE POLLUTION SURVEY

It is generally advisable to locate a field headquarters and laboratory close to the stream to be studied and readily accessible to a maximum of stream length. In this way, samples can be examined promptly after collection, hydrometric studies may be carried on to

advantage, including the operation and maintenance of stream gages, and special problems of domestic and industrial waste pollution may be investigated during the course of the routine field work. The location should be selected with consideration to the availability of water, gas, and electric current for laboratory use, railway and highway for transportation of needed materials and supplies, and highway connections for prompt delivery of samples from the stream sampling stations.

The sanitary survey.—Determination of the nature and extent of sources of pollution is largely a task of assembling available information from different agencies and filling in the gaps by original investigation. Distribution and density of urban and rural population on any watershed can be computed by employing the published reports of the United States Census Bureau, and a large scale map showing all political subdivisions and drainage areas of the watershed. State governmental agencies, particularly State health departments, usually have extensive data on sewered populations, nature and extent of sewage treatment and types, and sizes and products of industrial establishments, particularly those discharging objectionable liquid wastes. It is sometimes necessary to undertake special surveys of representative industrial plants to gage waste discharges and collect samples for analysis for correlation with raw material, production, or employee statistics. The amount of this work often may be reduced greatly by applying conversion factors thus developed for a representative plant to the wastes of all plants of this particular type of industry on the watershed.

Hydrometric relationships.—The hydrometric study should be conducted in sufficient detail to supply information on the daily volume of stream flow at each sampling station and at each point of significant pollution throughout the period of collection and analysis of samples. The velocity of flow between sampling stations and mouths of principal tributaries throughout the range of gage height fluctuations is also important in connection with the rapidity of travel of pollutional substances down stream. Basic data on stream flow can generally be obtained from the United States Geological Survey; or, if such gagings have not been made, cooperative arrangements can be worked out with that organization for the placing and maintenance of recording or other gages at the proper locations and the establishment of rating stations from which daily stream flows can be computed for the main stream and its principal tributaries. The district engineers of the Geological Survey can give most helpful advice also on methods of computation of stream flows from gage height-rating curve relationships and on the determination of velocities of flow and other essential hydrometric procedures. Velocities of flow may be determined by any of several different methods and the one to be selected will be

dependent upon the type of stream under observation and the extent of available knowledge of the stream channel. For large rivers, where accurate information on channel cross sections, stream profiles, and gage height records is available, the displacement method as used in our Ohio River (*1*) and Illinois River (*2*) studies is perhaps the most dependable. For smaller streams, observations of the velocities of travel of floats, dyes, salt solution, or other materials in the water through selected river stretches can be used. Wave-crest travel (*3*) also has been suggested as a method of computing flow velocities, but is not yet in general use. Diurnal variations in the chloride content as contributed by domestic sewage might be used also over considerable stretches of streams where the volume of sewage is large in proportion to the normal stream flow. Organizations concerned with flood control planning and construction, including the United States Army Engineers and State planning and water conservation agencies, are assembling extensive data that may be found most useful for this purpose.

Rainfall and weather records are also helpful in completing the hydrometric studies and for determining the relationship between rainfall and runoff in the different sections of the watershed. Precipitation data are generally obtainable from the United States Weather Bureau, and, where necessary, cooperative arrangements should be considered for increasing the number of rainfall observation stations on the watershed to be surveyed.

These hydrometric data should be collected and arranged with the specific objective of ascertaining the extent of natural dilution that is provided in comparison with the natural purification of contributed pollution that is occurring under varying conditions of stream flow. From the combination of these factors, the reserve capacity of the stream for additional pollution or the extent of pollution overload can be estimated, and, consequently, the determination made of the degree of purification of domestic sewage and industrial wastes that must be provided at each point in order to maintain the stream in the desired sanitary condition.

Sanitary condition of the water.—Determination of the extent of pollution of any body of water usually involves the examination of samples of the contributed polluting constituents and of the water and of bottom sediments of the channel collected throughout a sufficient period of time to take into account seasonal fluctuations in flow, variations in rates of natural purification, and other changing factors. It is generally best to establish definite points for the collection of samples rather than to depend upon random collections from indiscriminate locations. Such stations should be carefully selected with due regard to sources of pollution, mouths of tributaries, accessibility of transport to field laboratories, and representative sections of stream.

In many streams highway and railroad bridges determine the location of sampling stations. In large rivers, boats are frequently necessary to reach the desired points. In moderate or small streams, one sample at mid-depth is usually representative of the cross section. In large rivers, such as the Ohio and Illinois, we collected three samples on a cross section, each at the center of gravity of each third of the wetted cross sectional area. These samples were at first analyzed separately and the results averaged. Later, to reduce the amount of laboratory work, the three samples were composited and the composite analyzed. Comparison of the results by both methods indicated very little variation in the figures obtained. In our study of Lake Michigan (*4*), the water area under investigation was divided up by a grid of intersecting sight lines, and samples were collected at these intersections. Collections of water samples are generally made with the aid of some device that will permit obtaining the sample at any desired depth and in the amounts required for all analytical examinations. Sediment samples can be obtained with a mud scoop or various types of equipment which remove intact a section of deposit from the channel bottom.

The method of transport of samples to the field laboratory will depend on local facilities. In any event, samples should be delivered as quickly as possible after collection, and a maximum elapsed time should be established, not to exceed 6 hours. In warm weather it is desirable to ice all samples either by packing them in ice or in a chilled container. Good highways, when available, greatly facilitate the speedy transportation of samples by the sample collector himself and correspondingly extend the range of service of the field laboratory. In special cases bus or railway express transport service is cheapest, permitting in such instances the use of part-time services of persons in the vicinity of the sampling stations as collectors and shippers.

There are three general types of examination to which polluted water samples may be submitted: bacteriological, biological, and chemical, including biochemical. The laboratory equipment and personnel required for performing these tests will be governed by the number of samples to be examined daily and the tests which each sample will undergo. A good general rule to follow is to examine more frequent samples from a few well-selected sampling stations than a few samples from too large a number of sampling stations. Equipment should be ample but not necessarily elaborate. Much time is saved by an adequate supply of laboratory glassware. Reagents and culture media should be standardized and distributed from the central laboratory to insure uniformity of results. Dehydrated culture media can now be purchased in single lots in quantities sufficient for any reasonable field study. The amounts and nature of equipment and supplies required to operate chemical and bacteriological laboratories

of various sizes are given in various laboratory texts. Itemized lists which we have found satisfactory for routine laboratory examination of water and sewage samples have been compiled for our use, copies of which are available on application.

Professional personnel trained in the standardized technique of water examination are essential for the best results. Analytical procedures should conform strictly to the standard methods adopted jointly by the American Public Health and the American Water Works Associations in order that the finished results may be comparable with those of other workers. Any deviations from these accepted methods, however slight, should be described in detail. The range of analytical tests of samples will depend upon the planned thoroughness of the pollution study and its objectives. The minimum of bacteriological tests would include the determination of coliform group organisms and, in special instances, plate counts on agar incubated at 37° C. for 24 hours. The chemical examinations as a minimum should include turbidity, hydrogen ion concentration, dissolved oxygen, and 5-day biochemical oxygen demand. Plankton examinations should distinguish the relative numbers of pollution indicator organisms, both free floating and in bottom sediments, and be made at sufficiently frequent intervals to record the pulses of various indicator forms as they occur during the progress of the seasons. Usually, weekly examinations of water samples and monthly examinations of bottom sediments will meet these requirements.

For more comprehensive studies this laboratory work can be expanded. Thus, in our Scioto River study now in progress, some additional analytical tests are conducted. For the determination of coliform organisms, lactose broth followed by 2 percent brilliant green bile is employed for the confirmed test. In addition, one confirmed sample, rotated daily, is carried to completion through Endo, second lactose broth, second Endo, and agar slant for Gram stain, purity, and spore test. The total bacterial colony count is made for each sample also, using agar plates incubated at 37° C. for 24 hours. The routine chemical tests on each sample include turbidity, hydrogen ion concentration, dissolved oxygen, 5-day biochemical oxygen demand, suspended solids, and alkalinity. To trace further the course of oxidation, one sample, rotated each day, is put up for determination of the 3-, 5-, 7-, 10-, 12-, 15-, 20-, and 25-day oxygen demand.

In addition, samples from selected stations are composited over a period of 1 month, preserved by sulfuric acid, and then shipped to our central laboratory for determination of nitrites, nitrates, ammonia, and organic nitrogen.

The biological examination consists in the determination of the plankton content of water samples collected biweekly, preserved in 6

percent formalin, and shipped to our central laboratory. On alternate weeks similar samples are examined, without the use of preservative, at our Chillicothe field laboratory. Sediment samples are collected once each month, preserved in formalin, and shipped to our headquarters laboratory for determination of pollution indicator organisms.

With the constant accumulation of survey and laboratory data, some attention should be paid to the maintenance and filing of proper current records, summaries, and progress reports. Frequent, careful reviews of the trend of results will indicate the advisability of changes in field methods, relocation, omission or addition of certain sampling stations, recurring errors in sampling or laboratory technique, and various other modifications in procedure that, unless made early in the field study, will greatly detract from the value of the completed work.

The most difficult feature, perhaps, of any stream pollution survey is the critical weighing of all the evidence, the derivation of conclusions based on this evidence, and the presentation of this material in concise, understandable form. Too much time and concentration cannot be devoted to this part of the survey when it is remembered that the finished report will be the only permanent record generally available. Every effort should be made, therefore, to derive from the carefully summarized data all the pertinent facts which they contain, to point them out in their logical sequence, and to draw from them unbiased, logical conclusions that are well substantiated. Usually it will be advisable to limit the tabulated material to monthly or periodic averages rather than to publish tables of detailed analytical results. Diagrams illustrative of outstanding trends are most helpful in reinforcing the text. Photographs have a place in reports prepared for the general reader. Pollution surveys thus reported are of more than local value; they add to our general knowledge of the resultant effects of pollution discharged to streams and of the essential correctional measures necessary for stream improvement.

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(4) Report of investigation of the pollution of Lake Michigan in the vicinity of South Chicago and the Calumet and Indiana harbors, 1924–25. By H. R. Crohurst and M. V. Veldee. Pub. Health Bull. No. 170 (February 1927).

CARE DURING THE RECOVERY PERIOD IN PARALYTIC POLIOMYELITIS

The United States Public Health Service has recently issued a report[1] containing a detailed presentation of the after care of convalescent poliomyelitis patients as given at the Children's Hospital School in Baltimore, Md. This monograph has been written primarily to stress the importance of careful handling of the weak or paralyzed muscles in order to prevent deformities and obtain the maximum recovery of muscle strength.

The introduction by Drs. Bennett and Johnson discusses briefly some pathological changes in poliomyelitis. Part I presents the principles of rest, protection, and stimulative treatment. Part II explains the principles involved in detailed muscle examinations. In part III, all muscles of extremities, head, and upper trunk are charted according to (*a*) muscle group and isolated muscles, (*b*) position for testing, (*c*) test movement. Part IV is a detailed description of the position, actions, and test movements of the abdominal muscles. Part V is a description of the protection used for weakness of muscle groups or individual muscles, and is charted according to (*a*) weak muscle or muscle groups, (*b*) protection position, and (*c*) type of protective support. Part VI describes the actions in the upright position of some of the important muscles, and explains how the function in weight bearing differs from the action in the lying position.

The Bulletin is well illustrated with drawings and photographs showing the examination and testing of muscles, muscle protection and training, and correctional braces.

DEATHS DURING WEEK ENDED APRIL 16, 1938

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 16, 1938	Corresponding week, 1937
Data from 86 large cities of the United States:		
Total deaths	8,646	9,122
Average for 3 prior years	9,038	
Total deaths, first 15 weeks of year	132,973	151,357
Deaths under 1 year of age	517	594
Average for 3 prior years	594	
Deaths under 1 year of age, first 15 weeks of year	8,100	9,371
Data from industrial insurance companies:		
Policies in force	69,653,205	69,693,853
Number of death claims	12,072	14,545
Death claims per 1,000 policies in force, annual rate	9.0	10.9
Death claims per 1,000 policies, first 15 weeks of year, annual rate	10.0	11.5

[1] Public Health Bulletin No. 242. By Henry O. Kendall and Florence P. Kendall, Children's Hospital School, Baltimore, Md., with an introduction by George E. Bennett and Robert W. Johnson, Jr., Johns Hopkins University School of Medicine, Baltimore, Md. U. S. Govt. Printing Office, Washington, D. C. Price 20 cents.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables a zero (0) is to be interpreted to mean that no cases or deaths occurred, while leaders (------) indicate that cases or deaths may have occurred although none were reported.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 23, 1938, and Apr. 24, 1937

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937
New England States:								
Maine	3	2	4	1	222	21	0	0
New Hampshire	0	0	------	------	37	26	0	0
Vermont	0	0	------	------	141	1	0	0
Massachusetts	5	2	------	------	344	621	1	5
Rhode Island	0	0	------	------	2	194	1	1
Connecticut	6	4	5	4	38	632	1	3
Middle Atlantic States:								
New York	31	62	[1] 9	[1] 10	4,095	1,152	5	8
New Jersey	11	17	4	7	1,834	2,082	0	2
Pennsylvania	45	38	------	------	5,507	1,112	8	8
East North Central States:								
Ohio	11	6	------	23	2,013	1,041	2	1
Indiana	15	5	8	13	1,306	400	1	1
Illinois	37	35	6	64	2,906	188	0	5
Michigan [2]	13	20	2	1	4,588	138	3	3
Wisconsin	0	4	17	52	2,730	34	0	2
West North Central States:								
Minnesota	4	1	2	------	292	23	1	1
Iowa	2	4	1	51	228	12	1	0
Missouri	7	21	45	92	386	56	1	6
North Dakota	1	4	3	27	240	2	1	1
South Dakota	1	0	------	------	------	------	0	0
Nebraska	1	1	------	------	154	18	1	4
Kansas	3	2	7	4	770	47	0	0
South Atlantic States:								
Delaware	1	1	------	------	40	67	0	1
Maryland [2]	1	14	6	11	101	606	1	4
District of Columbia	4	2	------	1	23	107	2	2
Virginia	9	9	------	------	457	617	2	7
West Virginia	3	7	22	33	371	108	7	4
North Carolina [2]	15	12	8	30	2,412	133	2	13
South Carolina [2]	4	5	154	388	243	64	0	1
Georgia [2]	4	3	------	131	597	------	0	1
Florida	5	1	2	------	368	------	0	14

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 23, 1938, and Apr. 24, 1937—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937
East South Central States:								
Kentucky	6	2	9	15	403	375	4	28
Tennessee	2	10	25	48	260	36	5	4
Alabama [3]	3	9	45	151	600	35	6	18
Mississippi [3]	2	5	----	----	----	----	1	0
West South Central States:								
Arkansas	12	1	44	107	322	1	0	1
Louisiana [3]	9	15	6	18	15	8	3	5
Oklahoma [4]	4	12	41	108	123	77	0	1
Texas [3]	29	46	233	564	208	811	0	4
Mountain States:								
Montana	0	0	----	6	23	19	0	1
Idaho	0	0	3	10	14	71	0	0
Wyoming [3]	0	0	----	----	58	11	0	0
Colorado	13	7	----	----	352	6	3	1
New Mexico	1	5	1	2	70	134	0	1
Arizona	1	3	51	29	29	165	0	0
Utah [3]	0	0	----	----	265	24	1	0
Pacific States:								
Washington	5	0	----	----	7	52	0	0
Oregon [3]	2	0	28	18	62	10	0	2
California	24	50	15	98	685	293	0	5
Total	355	447	806	2,117	35,941	11,630	64	169
First 16 weeks of year	8,902	8,084	38,103	264,910	523,973	115,783	1,359	2,708

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fever		Whooping cough
	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938
New England States:									
Maine	0	0	35	26	0	0	0	1	33
New Hampshire	0	0	7	6	0	0	0	0	----
Vermont	0	0	6	9	0	0	0	0	25
Massachusetts	0	0	369	245	0	0	1	9	95
Rhode Island	0	0	17	46	0	0	0	1	----
Connecticut	0	0	119	163	0	0	1	0	57
Middle Atlantic States:									
New York	0	0	822	1,026	0	0	1	5	389
New Jersey	2	0	149	205	0	0	5	4	202
Pennsylvania	2	0	692	589	0	0	11	7	256
East North Central States:									
Ohio	2	0	214	229	7	0	6	6	109
Indiana	0	0	88	160	67	19	9	1	30
Illinois	2	0	458	814	20	55	3	3	136
Michigan [3]	0	0	455	816	6	1	2	2	312
Wisconsin	0	1	167	305	9	4	1	2	174
West North Central States:									
Minnesota	0	0	102	158	14	22	0	0	16
Iowa	0	1	179	271	47	34	0	2	19
Missouri	0	0	86	405	27	74	2	3	18
North Dakota	0	0	30	32	5	58	1	1	18
South Dakota	0	0	13	59	17	7	0	0	6
Nebraska	0	1	21	195	9	12	0	0	11
Kansas	1	0	111	289	24	20	4	0	118
South Atlantic States:									
Delaware	0	0	16	6	0	0	0	0	11
Maryland [3]	0	0	69	58	0	0	1	4	48
District of Columbia	0	0	27	18	0	0	0	1	13
Virginia	0	0	31	8	0	0	2	1	61
West Virginia	1	2	36	59	0	1	0	1	86
North Carolina [3]	1	0	24	41	0	1	1	2	355
South Carolina [3]	0	0	3	1	0	0	0	1	65
Georgia [3]	1	0	2	6	0	0	7	3	92
Florida	0	0	5	42	0	0	3	2	25

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 23, 1938, and Apr. 24, 1937—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fever		Whooping cough
	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938	Week ended Apr. 24, 1937	Week ended Apr. 23, 1938
East South Central States:									
Kentucky	2	0	51	60	16	0	3	4	52
Tennessee	0	0	22	30	0	0	0	1	41
Alabama [3]	0	0	5	10	0	1	0	0	33
Mississippi [3]	1	3	3	1	1	0	3	0	--------
West South Central States:									
Arkansas	0	0	5	13	6	5	6	3	35
Louisiana [3]	0	0	9	13	0	0	16	6	34
Oklahoma [4]	1	0	23	41	3	3	0	11	51
Texas [3]	2	2	183	123	8	7	15	7	244
Mountain States:									
Montana	0	0	12	25	4	14	0	2	26
Idaho	0	0	6	27	12	3	1	0	5
Wyoming [5]	0	0	3	5	0	2	0	0	10
Colorado	1	0	47	40	4	9	1	1	46
New Mexico	0	1	11	44	0	0	2	3	42
Arizona	0	2	7	19	15	0	1	0	46
Utah [2]	0	0	60	22	2	0	0	0	82
Pacific States:									
Washington	0	1	35	26	32	14	0	1	167
Oregon [5]	0	0	53	30	10	19	0	0	28
California	0	2	154	202	52	14	9	6	619
Total	19	16	5,042	7,018	417	399	118	107	4,341
First 16 weeks of year	326	339	95,816	110,251	8,588	5,097	1,895	1,751	66,701

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Apr. 23, 1938, 12 cases as follows: North Carolina, 1; South Carolina, 1; Georgia 6; Alabama, 2; Louisiana, 1; Texas, 1.
[4] Figures for 1937 are exclusive of Oklahoma City and Tulsa.
[5] Rocky Mountain spotted fever, week ended Apr. 23, 1938, 3 cases as follows: Wyoming, 2; Oregon, 1.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
March 1938										
California	19	173	324	10	2,845	19	11	1,190	197	22
Florida	4	47	9	17	3,466	5	0	23	1	8
Georgia	8	40	327	100	1,827	61	4	34	16	14
Illinois	10	154	62	7	28,201	1	7	2,834	181	23
Louisiana	9	43	54	37	57	10	2	58	7	108
Maryland	4	32	58	2	352	1	0	377	0	5
Mississippi	4	28	4,893	1,458	1,964	284	3	25	1	8
Montana	1	5	227	--------	177	--------	0	101	38	2
Nebraska	24	23	64	--------	166	--------	0	202	28	0
Nevada	0	3	16	--------	42	--------	0	9	0	3
New York	34	148	--------	7	10,619	--------	8	4,479	0	18
North Dakota	2	5	79	--------	113	--------	1	111	46	0
Oklahoma	3	30	489	20	321	15	2	92	53	7
Oregon	0	3	234	--------	106	--------	1	207	121	4
Pennsylvania	20	206	--------	1	31,994	1	3	2,844	0	27
Rhode Island	3	2	5	--------	19	--------	0	136	0	1
South Carolina	--------	139	1,375	274	1,879	67	0	12	0	1
South Dakota	1	2	31	--------	17	--------	0	69	62	0
Tennessee	19	33	320	11	2,903	28	1	151	38	11
Texas	12	173	2,635	33	1,449	146	6	487	94	47
Washington	3	11	62	--------	47	--------	2	228	215	7

Summary of monthly reports from States—Continued

March 1938

	Cases
Actinomycosis:	
Illinois	2
Anthrax:	
Pennsylvania	1
South Dakota	1
Botulism:	
Washington	7
Chickenpox:	
California	5,320
Florida	310
Georgia	279
Illinois	2,294
Louisiana	117
Maryland	858
Mississippi	742
Montana	391
Nebraska	240
Nevada	2
New York	4,487
North Dakota	181
Oklahoma	103
Oregon	423
Pennsylvania	5,059
Rhode Island	110
South Carolina	186
South Dakota	141
Tennessee	169
Texas	1,000
Washington	862
Conjunctivitis:	
Georgia (acute infectious)	4
Washington	1
Dengue:	
Mississippi	2
South Carolina	2
Texas	8
Diarrhea:	
Maryland	3
South Carolina	219
Dysentery:	
California (amoebic)	8
California (bacillary)	32
Florida	2
Georgia (amoebic)	11
Georgia (bacillary)	3
Illinois (amoebic)	6
Illinois (amoebic carriers)	23
Illinois (bacillary)	5
Louisiana (amoebic)	4
Maryland (bacillary)	6
Mississippi (amoebic)	84
Mississippi (bacillary)	232
New York (amoebic)	18
New York (bacillary)	51
Oklahoma	2
Pennsylvania (amoebic)	2
Tennessee (amoebic)	1
Tennessee (bacillary)	4
Texas (amoebic)	1
Texas (bacillary)	39
Washington (amoebic)	1
Encephalitis, epidemic or lethargic:	
California	5
Florida	1
Illinois	6
Louisiana	1
Maryland	1
New York	15
Pennsylvania	4
Tennessee	1
Texas	3
Food poisoning:	
California	40
German measles:	
California	174
Florida	1
Illinois	211
Maryland	23
German measles—Con.	
Montana	4
New York	259
North Dakota	2
Pennsylvania	316
Rhode Island	17
Tennessee	1
Washington	10
Granuloma, coccidioidal:	
California	9
Hookworm disease:	
California	1
Florida	1,185
Georgia	2,656
Louisiana	28
South Carolina	97
Tennessee	1
Impetigo contagiosa:	
Illinois	12
Maryland	9
Montana	6
Oregon	109
Tennessee	1
Washington	3
Jaundice:	
California (epidemic)	38
Maryland	1
Leprosy:	
Louisiana	1
Mumps:	
California	2,965
Florida	83
Georgia	250
Illinois	1,132
Louisiana	6
Maryland	199
Mississippi	360
Montana	196
Nebraska	165
Nevada	136
North Dakota	54
Oklahoma	13
Oregon	96
Pennsylvania	6,417
Rhode Island	54
South Carolina	103
South Dakota	89
Tennessee	314
Texas	360
Washington	1,011
Ophthalmia neonatorum:	
Florida	3
Illinois	3
New York [1]	8
Pennsylvania	5
South Carolina	3
South Dakota	4
Tennessee	3
Paratyphoid fever:	
California	5
Georgia	4
Louisiana	5
New York	8
Tennessee	1
Texas	3
Puerperal septicemia:	
Georgia	5
Mississippi	23
Tennessee	7
Rabies in animals:	
California	209
Florida	2
Illinois	43
Louisiana	26
Maryland	1
Mississippi	26
New York [1]	12
Oregon	3
Rhode Island	4
South Carolina	43
Washington	30
Rabies in man:	
California	2
Rocky Mountain spotted fever:	
Oregon	1
Tennessee	1
Scabies:	
Maryland	3
Montana	5
Oklahoma	8
Oregon	126
Washington	5
Septic sore throat:	
California	15
Florida	1
Georgia	32
Illinois	6
Louisiana	16
Maryland	35
Montana	9
Nebraska	1
New York	226
Oklahoma	67
Oregon	24
Rhode Island	40
South Dakota	13
Tennessee	22
Washington	10
Tetanus:	
California	9
Florida	2
Illinois	2
Louisiana	4
Maryland	1
New York	2
Tennessee	2
Trachoma:	
California	46
Illinois	39
Montana	20
Oklahoma	3
South Dakota	1
Tennessee	2
Trichinosis:	
California	15
Illinois	2
Maryland	1
New York	26
Tularaemia:	
California	2
Georgia	11
Illinois	2
Louisiana	15
Montana	1
New York	1
Oklahoma	4
Pennsylvania	1
Tennessee	1
Texas	6
Typhus fever:	
Florida	4
Georgia	27
Louisiana	1
New York	1
South Carolina	1
Tennessee	1
Texas	20
Undulant fever:	
California	19
Florida	3
Georgia	6
Illinois	10
Louisiana	8
Maryland	4
Mississippi	1
New York	25
Oklahoma	122
Pennsylvania	12
Rhode Island	4
South Carolina	1
Tennessee	1
Texas	14
Washington	4

[1] Exclusive of New York City.

Summary of monthly reports from States—Continued

March 1938—Continued

Vincent's infection:	Cases
Florida	51
Illinois	21
Maryland	11
Montana	1
New York [1]	100
North Dakota	1
Oregon	10
Tennessee	1
Washington	5

Whooping cough:	Cases
California	2,562
Florida	36
Georgia	200
Illinois	494
Louisiana	97
Maryland	301
Mississippi	955
Montana	162
Nebraska	43
Nevada	10
New York	1,976

Whooping cough—Con.	Cases
North Dakota	97
Oklahoma	158
Oregon	80
Pennsylvania	1,276
Rhode Island	162
South Carolina	310
South Dakota	99
Tennessee	224
Texas	1,290
Washington	714

[1] Exclusive of New York City.

WEEKLY REPORTS FROM CITIES

City reports for week ended Apr. 16, 1938

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	184	256	83	7,304	815	2,530	26	423	26	4,415	----
Current week [1]	117	104	32	10,616	615	1,948	23	395	21	1,118	----
Maine:											
Portland	0	----	0	13	2	4	0	0	1	15	19
New Hampshire:											
Concord	0	----	0	0	3	1	0	0	0	1	10
Manchester	0	----	0	0	1	4	0	1	0	0	23
Nashua	0	----	0	0	0	0	0	0	0	0	7
Vermont:											
Barre	0	----	----	0	----	0	0	----	0	0	----
Burlington	0	----	0	8	0	0	0	0	0	1	8
Rutland	0	----	0	0	1	0	0	0	0	0	6
Massachusetts:											
Boston	1	----	1	232	22	113	0	9	0	20	234
Fall River	0	----	1	1	1	0	0	0	0	0	29
Springfield	0	----	0	16	1	1	0	1	0	8	37
Worcester	0	----	0	0	8	17	0	2	0	5	57
Rhode Island:											
Pawtucket	0	----	0	0	0	2	0	0	0	0	19
Providence	0	1	0	0	11	11	0	0	0	15	84
Connecticut:											
Bridgeport	0	----	0	0	3	23	0	1	0	0	29
Hartford	0	----	0	4	3	25	0	1	0	0	26
New Haven	0	----	0	0	0	2	0	0	0	2	43
New York:											
Buffalo	0	----	1	2	19	90	0	8	0	18	147
New York	31	5	3	2,281	127	466	0	84	1	202	1,585
Rochester	1	1	0	6	4	16	0	0	1	6	76
Syracuse	0	----	0	31	4	8	0	0	0	8	65
New Jersey:											
Camden	1	----	0	43	1	1	0	1	0	1	23
Newark	0	----	0	16	12	7	0	2	0	31	74
Trenton	0	----	0	0	4	2	0	3	0	1	27
Pennsylvania:											
Philadelphia	3	9	2	1,084	24	136	0	22	2	43	488
Pittsburgh	1	2	2	117	19	53	0	4	0	21	157
Reading	0	----	0	20	2	2	0	0	0	2	39
Scranton	0	----	----	27	----	7	0	----	0	0	----
Ohio:											
Cincinnati	4	----	0	9	6	12	0	11	0	4	144
Cleveland	0	16	3	332	14	55	0	10	0	26	197
Columbus	3	2	2	60	3	8	2	3	0	2	82
Toledo	0	1	1	113	3	4	0	10	0	12	58
Indiana:											
Anderson	0	----	0	150	3	2	0	0	0	0	16
Fort Wayne	1	----	0	49	7	3	0	1	0	0	26
Indianapolis	0	----	1	171	9	20	2	7	0	0	115
South Bend	0	----	0	42	1	10	0	0	0	0	17
Terre Haute	1	----	0	12	0	4	0	0	0	0	15

[1] Figures for Fargo estimated; report not received.

City reports for week ended Apr. 16, 1938—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Illinois:											
Alton	0	------	0	1	2	3	0	0	0	0	9
Chicago	10	3	1	1,373	38	261	0	50	1	51	728
Elgin	0	------	0	0	1	4	0	0	0	1	11
Moline	0	------	0	16	0	3	0	0	0	0	5
Springfield	0	------	0	112	2	2	0	0	0	0	18
Michigan:											
Detroit	9	2	0	1,593	19	162	0	18	1	93	277
Flint	0	------	0	142	2	55	0	0	0	20	22
Grand Rapids	0	------	0	159	2	6	0	1	0	4	32
Wisconsin:											
Kenosha	0	------	0	98	2	0	0	0	0	0	13
Madison	0	------	0	75	0	2	0	0	0	7	8
Milwaukee	1	------	0	354	7	12	0	5	0	71	125
Racine	0	------	0	388	0	6	0	0	0	13	13
Superior	0	------	0	6	0	1	0	0	0	0	4
Minnesota:											
Duluth	0	------	0	5	5	1	0	1	0	10	21
Minneapolis	0	------	0	49	6	25	1	0	0	0	105
St. Paul	1	------	0	4	5	5	0	0	0	1	53
Iowa:											
Cedar Rapids	0	------	--------	1	-------	5	0	-------	0	3	--------
Davenport	0	------	--------	1	-------	2	0	-------	0	0	--------
Des Moines	0	------	0	22	0	27	3	0	0	0	4
Sioux City	0	------	--------	0	-------	10	0	-------	0	1	--------
Waterloo	0	------	--------	111	-------	8	1	-------	0	0	--------
Missouri:											
Kansas City	0	1	0	61	12	18	0	2	0	5	85
St. Joseph	0	------	0	41	5	1	0	0	0	0	31
St. Louis	5	------	0	3	6	77	0	4	0	0	221
North Dakota:											
Fargo	0	------	0	1	2	0	0	1	0	0	7
Grand Forks	0	------	--------	83	-------	0	0	-------	0	0	--------
Minot	0	------	0	0	0	0	3	0	0	1	7
South Dakota:											
Aberdeen	0	------	--------	0	-------	2	0	-------	0	1	--------
Sioux Falls	0	------	0	0	0	0	0	0	0	0	12
Nebraska: Omaha	0	------	1	80	9	2	0	3	0	1	51
Kansas:											
Lawrence	0	1	1	4	0	0	0	0	0	0	3
Topeka	0	------	0	141	0	4	0	0	0	28	11
Wichita	1	------	0	15	3	3	1	0	0	0	27
Delaware:											
Wilmington	2	------	0	16	2	0	0	1	0	2	25
Maryland:											
Baltimore	2	4	1	8	27	40	0	9	0	34	252
Cumberland	0	------	0	3	2	2	0	0	0	0	14
Frederick	1	------	0	2	0	2	0	0	0	0	2
District of Columbia:											
Washington	2	2	1	19	10	26	0	16	2	7	167
Virginia:											
Lynchburg	0	------	0	2	0	0	0	1	0	1	7
Norfolk	0	1	0	31	4	4	0	1	0	4	25
Richmond	0	------	1	125	8	4	0	1	0	0	48
Roanoke	0	------	0	0	1	1	0	1	0	2	19
West Virginia:											
Charleston	1	------	0	6	3	0	0	2	0	0	35
Wheeling	0	------	0	109	1	3	0	3	0	7	22
North Carolina:											
Gastonia	1	------	--------	47	-------	0	0	-------	0	12	--------
Raleigh	0	------	0	67	3	0	0	1	0	2	15
Wilmington	0	------	0	100	0	0	0	0	0	16	6
Winston-Salem	0	------	0	18	0	1	0	1	0	25	10
South Carolina:											
Charleston	0	18	1	7	1	1	0	3	0	0	24
Florence	0	------	0	25	0	0	0	0	0	0	16
Greenville	0	------	0	1	0	0	0	0	0	4	9
Georgia:											
Atlanta	0	7	0	20	8	1	0	2	0	7	85
Brunswick	1	------	0	1	0	0	0	0	0	0	2
Savannah	0	------	0	51	1	0	0	3	0	2	28
Florida:											
Miami	1	1	1	29	0	0	0	2	2	1	24
Tampa	1	1	1	33	2	0	0	1	0	0	31
Kentucky:											
Ashland	0	3	--------	0	-------	1	0	-------	0	3	--------
Covington	6	------	0	0	1	1	0	1	0	0	23
Lexington	1	------	0	2	2	1	0	2	0	2	20
Louisville	5	2	0	232	6	21	0	0	0	1	58

City reports for week ended Apr. 16, 1938—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Tennessee:											
Knoxville	3	----	0	33	1	1	0	0	0	1	18
Memphis	0	----	2	35	6	0	0	7	1	1	98
Nashville	0	----	1	44	2	6	0	3	2	6	47
Alabama:											
Birmingham	2	10	1	41	3	5	0	4	0	0	73
Mobile	0	----	0	9	2	0	0	2	0	0	23
Montgomery	1	----	----	145	----	0	0	----	0	2	----
Arkansas:											
Fort Smith	0	----	----	0	----	1	0	----	0	2	----
Little Rock	0	----	0	4	1	2	0	0	0	4	----
Louisiana:											
Lake Charles	0	----	0	2	0	0	0	0	0	0	1
New Orleans	2	5	0	4	12	0	5	13	4	9	122
Shreveport	0	----	0	7	4	2	0	2	0	0	46
Oklahoma:											
Muskogee	0	----	----	0	----	1	0	----	0	0	----
Oklahoma City	1	----	0	0	2	2	0	3	0	0	43
Tulsa	0	----	----	98	----	1	5	----	0	2	----
Texas:											
Dallas	2	1	1	6	2	3	0	3	0	1	61
Fort Worth	0	----	0	1	3	2	0	3	0	7	40
Galveston	1	----	0	0	3	1	0	1	0	0	13
Houston	4	----	0	2	9	5	3	6	3	0	91
San Antonio	0	----	1	1	5	1	0	13	0	0	84
Montana:											
Billings	0	----	0	0	2	0	0	0	0	6	10
Great Falls	0	----	0	0	3	1	1	0	0	8	11
Helena	0	----	0	0	0	0	0	0	0	1	1
Missoula	0	----	0	0	2	0	0	0	0	0	6
Idaho:											
Boise	1	----	0	0	1	1	4	0	0	0	9
Colorado:											
Colorado Springs	0	----	0	0	0	1	0	3	0	5	16
Denver	3	----	1	160	5	15	0	5	0	13	74
Pueblo	1	----	0	1	0	1	0	1	0	27	10
New Mexico:											
Albuquerque	0	----	0	2	0	0	0	0	0	1	8
Utah:											
Salt Lake City	1	----	0	240	3	12	0	1	0	1	32
Washington:											
Seattle	1	----	1	2	10	6	0	0	0	20	104
Spokane	0	1	1	0	4	2	1	0	0	23	29
Tacoma	0	----	0	0	2	9	0	1	0	13	38
Oregon:											
Portland	2	----	1	15	5	15	0	0	0	0	77
Salem	0	2	----	0	----	0	0	----	0	0	----
California:											
Los Angeles	13	13	0	31	17	40	2	16	0	38	317
Sacramento	1	----	0	9	4	5	0	0	1	41	34
San Francisco	0	----	0	2	8	7	0	17	0	53	167

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				Iowa:			
Buffalo	6	2	0	Des Moines	2	0	0
New York	2	0	0	Maryland:			
Pennsylvania:				Baltimore	1	0	0
Pittsburgh	1	0	0	District of Columbia:			
Ohio:				Washington	1	0	0
Cincinnati	1	0	0	Tennessee:			
Illinois:				Knoxville	0	0	1
Chicago	1	0	0	Alabama:			
Michigan:				Birmingham	2	0	1
Detroit	1	0	0	Colorado:			
				Pueblo	1	0	0

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Philadelphia, 1; Chicago, 1; Detroit, 1; Salem, Oreg., 1; San Francisco, 1.

Pellagra.—Cases: Washington, 1; Atlanta, 1; Savannah, 2; Miami, 1; Louisville, 1; Birmingham, 1; San Francisco, 1.

FOREIGN AND INSULAR

GREAT BRITAIN

England and Wales—Infectious diseases—13 weeks ended January 1, 1938.—During the 13 weeks ended January 1, 1938, certain infectious diseases were reported in England and Wales as follows:

Disease	Cases	Disease	Cases
Diphtheria	20,854	Puerperal pyrexia	[1] 2,200
Dysentery	3,000	Scarlet fever	32,869
Ophthalmia neonatorum	1,160	Smallpox	1
Pneumonia	12,383	Typhoid fever	695

[1] Includes puerperal fever.

England and Wales—Vital statistics—Fourth quarter 1937.—During the quarter ended December 31, 1937, 142,846 live births and 127,041 deaths were registered in England and Wales. The following statistics are taken from the Quarterly Return of Births, Deaths, and Marriages, issued by the Registrar General of England and Wales, and are provisional:

Birth and death rates in England and Wales, quarter ended Dec. 31, 1937

Annual rates per 1,000 population:		Annual rates per 1,000 population—Contd.	
Live births	13.8	Deaths from—Continued.	
Stillbirths	.57	Influenza	0.11
Deaths, all causes	12.3	Measles	.03
Deaths under 1 year of age	[1] 61	Scarlet fever	.01
Deaths from:		Typhoid and paratyphoid fevers	.01
Diarrhea and enteritis (under 2 years of age)	[1] 7.0	Violence	.53
Diphtheria	.08	Whooping cough	.02

[1] Per 1,000 live births.

ITALY

Communicable diseases—4 weeks ended February 27, 1938.—During the 4 weeks ended February 27, 1938, cases of certain communicable diseases were reported in Italy as follows:

Disease	Jan. 31-Feb. 6	Feb. 7-13	Feb. 14-20	Feb. 21-27
Anthrax	17	14	9	9
Cerebrospinal meningitis	41	36	39	35
Chickenpox	398	409	395	432
Diphtheria	719	697	653	643
Dysentery	27	18	22	14
Hookworm disease	12	7	9	9
Lethargic encephalitis	4	3	3	1
Measles	2,706	2,980	3,074	3,556
Mumps	363	327	307	335
Paratyphoid fever	27	47	53	44
Pellagra	1	1	1	4
Poliomyelitis	18	19	24	12
Puerperal fever	54	37	58	42
Scarlet fever	259	280	319	296
Typhoid fever	296	261	221	183
Undulant fever	74	93	96	67
Whooping cough	380	361	299	356

JAMAICA

Communicable diseases—4 weeks ended April 16, 1938.—During the 4 weeks ended April 16, 1938, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	2	Leprosy	1	3
Chickenpox	13	69	Puerperal fever	----	6
Diphtheria	2	----	Scarlet fever	----	1
Dysentery	22	8	Tuberculosis	40	86
Erysipelas	----	2	Typhoid fever	4	24

YUGOSLAVIA

Communicable diseases—4 weeks ended March 27, 1938.—During the 4 weeks ended March 27, 1938, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	15	----	Paratyphoid fever	13	----
Cerebrospinal meningitis	117	37	Scarlet fever	244	3
Diphtheria and croup	649	50	Sepsis	13	5
Dysentery	18	1	Tetanus	15	8
Erysipelas	198	3	Typhoid fever	254	24
Favus	10	----	Typhus fever	106	5
Lethargic encephalitis	1	1	Weil's disease	1	----

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for April 29, 1938, pages 685-700. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

Indochina (French).—During the week ended April 16, 1938, cholera was reported in French Indochina as follows: Annam Province, 65 cases; Tonkin Province, 121 cases; Hanoi, 13 cases.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau Sector.—A rat found on April 11, 1938, in Paauhau Sector, Hamakua District, Island of Hawaii, Hawaii Territory, has been proved positive for plague.

Iraq—Baghdad.—On January 11, 1938, 1 plague-infected rat was reported in Baghdad, Iraq.

Typhus Fever

Bolivia.—During the month of March 1938, typhus fever was reported in Bolivia as follows: La Paz, La Paz Department, 3 cases; Oruro, Oruro Department, 1 case; Potosi, Potosi Department, 7 cases.

Yellow Fever

Brazil.—Yellow fever has been reported in Brazil as follows: Minas Geraes State, March 17–26, 4 deaths; Rio de Janeiro State, March 17–28, 11 deaths; Santa Catharina State, March 21–27, 7 deaths.

Senegal—Diourbel.—On April 15, 1938, 1 death from suspected yellow fever was reported in Diourbel, Senegal.